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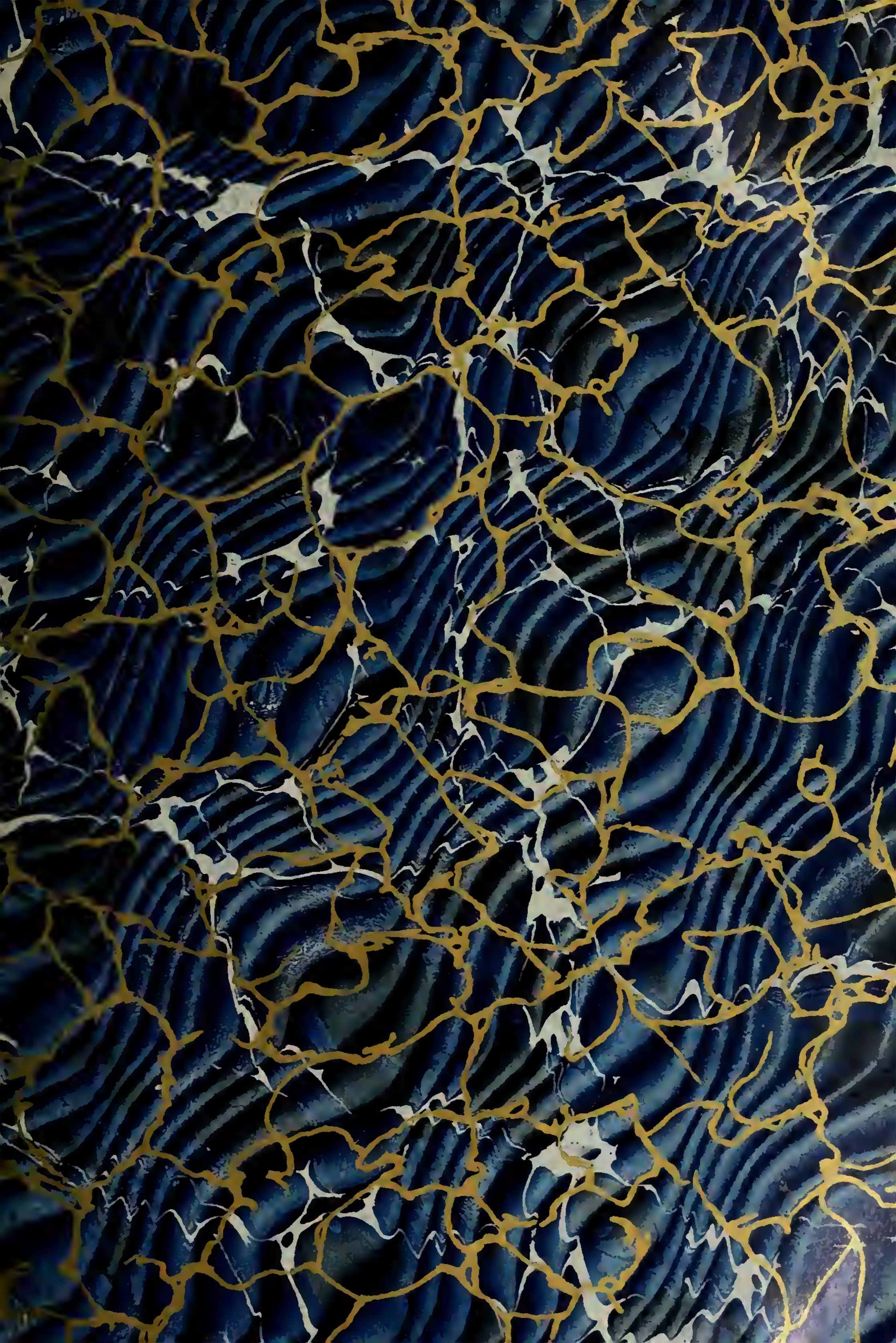

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THE NEW
INTERNATIONAL
ENCYCLOPÆDIA

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VOLUME IV

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ILLUSTRATIONS IN VOLUME IV.

COLORED PLATES

Facing Page

California Flora 34
California Shrubs 36
Canidæ—Dog Family 138
Cereals 434
Chrysanthemums 720
Citrus Fruits 772
Clams and Edible Mussels 800

MAPS

California 32
Canada 106
Cape Colony 164
Central America 422
Chicago 610
Chicago 612
Chile 624
China 640
Cincinnati 748
Civil War 792

ENGRAVINGS

Calabash, etc. 6
Camels and Llamas 78
Camellia, etc. 80
Canal 126
Canary Birds 130
Canterbury Cathedral 154
Caravaggio ("The Entombment of Christ") 188
Carlyle, Thomas 226
Carnations, etc. 230
Carnivores, American Minor 234
Carps and Their European Allies 240
Casa Grande and Cliff Dwellings (American Prehistoric Dwellings) 276
Cassowaries, etc. 292

Facing Page
Cats 312
Cats, Wild 314
Catfish 330
Cattle, Dairy 348
Cattle, Wild 350
Cavalry 366
Cavies, etc 384
Cedars of Lebanon 390
Cellini, Benvenuto ("Perseus") 402
Cephalopods 430
Cephalopods 432
Chamonix 476
Chaucer, Geoffrey 544
Chestnut 598
Chicago 606
Chicago 608
Cinchona 746

KEY TO PRONUNCIATION.

ā	as in ale, fate. Also see **ĕ**, below.
ā̇	“ “ senate, chaotic. Also see **ĕ**, below.
â	“ “ glare, care.
ă	“ “ am, at.
ä	“ “ arm, father.
ȧ	“ “ ant, and final *a* in America, armada, etc. In rapid speech this vowel readily becomes more or less obscured and like the neutral vowel or a short u (ŭ).
a	“ “ final, regal, where it is of a neutral or obscure quality.
a	“ “ all, fall.
ē	“ “ eve.
ē̇	“ “ elate, evade.
ĕ	“ “ end, pet. The characters *ĕ*, *ā*, and *ȧ* are used for *ä* in German, as in Gärtner, Gräfe, Hähnel, to the values of which they are the nearest English vowel sounds. The sound of Swedish *ä* is also indicated by *ĕ*.
ẽ	“ “ fern, her, and as *i* in sir. Also for *ö*, *oe*, in German, as in Göthe, Goethe, Ortel, Oertel, and for *eu* and *oeu* in French, as in Neufchâtel, Crèvecœur; to which it is the nearest English vowel sound.
e	“ “ agency, judgment, where it is of a neutral or obscure quality.
ī	“ “ ice, quiet.
ī̇	“ “ quiescent.
ĭ	“ “ ill, fit.
ō	“ “ old, sober.
ō̇	“ “ obey, sobriety.
ô	“ “ orb, nor.
ŏ	“ “ odd, forest, not.
o	“ “ atom, carol, where it has a neutral or obscure quality.
oi	“ “ oil, boil, and for *eu* in German, as in Feuerbach.
o͞o	“ “ food, fool, and as *u* in rude, rule.
ou	“ “ house, mouse.
ū	“ “ use, mule.
ū̇	“ “ unite.
ŭ	“ “ cut, but.
ụ	“ “ full, put, or as *oo* in foot, book. Also for *ü* in German, as in München, Müller, and *u* in French, as in Buchez, Budé; to which it is the nearest English vowel sound.
û	“ “ urn, burn.
y	“ “ yet, yield.
B	“ “ the Spanish Habana, Cordoba, where it is like a *v* made with the lips alone, instead of with the teeth and lips.
ch	“ “ chair, cheese.
D	as in the Spanish Almodovar, pulgada, where it is nearly like *th* in English then, this.
g	“ “ go, get.
G	“ “ the German Landtag, and *ch* in Feuerbach, buch; where it is a guttural sound made with the back part of the tongue raised toward the soft palate, as in the sound made in clearing the throat.
H	as *j* in the Spanish Jijona, *g* in the Spanish gila; where it is a fricative somewhat resembling the sound of *h* in English hue or *y* in yet, but stronger.
hw	“ *wh* in which.
K	“ *ch* in the German ich, Albrecht, and *g* in the German Arensberg, Mecklenburg; where it is a fricative sound made between the tongue and the hard palate toward which the tongue is raised. It resembles the sound of *h* in hue, or *y* in yet; or the sound made by beginning to pronounce a *k*, but not completing the stoppage of the breath. The character K is also used to indicate the rough aspirates or fricatives of some of the Oriental languages, as of kh in the word Khan.
n̠	as in sinker, longer.
ng	“ “ sing, long.
N	“ “ the French bon, Bourbon, and *m* in the French Etampes; where it is equivalent to a nasalizing of the preceding vowel. This effect is approximately produced by attempting to pronounce ‘onion’ without touching the tip of the tongue to the roof of the mouth. The corresponding nasal of Portuguese is also indicated by N, as in the case of São Antão.
sh	“ “ shine, shut.
th	“ “ thrust, thin.
TH	“ “ then, this.
zh	as *z* in azure, and *s* in pleasure.

An apostrophe ['] is sometimes used to denote a glide or neutral connecting vowel, as in tā'b'l (table), kăz''m (chasm).

Otherwise than as noted above, the letters used in the respellings for pronunciation are to receive their ordinary English sounds.

When the pronunciation is sufficiently shown by indicating the accented syllables, this is done without respelling: as in the case of very common English words, and words which are so spelled as to insure their correct pronunciation if they are correctly accented. See the article on PRONUNCIATION.

A PARTIAL LIST OF THE LEADING ARTICLES IN VOLUME IV.

CALCULATING MACHINES.
Professor David Eugene Smith; Mr. Charles Shattuck Hill.

CALCULUS.
Professor David Eugene Smith.

CALENDAR.
Professor Harold Jacoby; Professor Edwin A. Start; Dr. W J McGee.

CALHOUN.
Professor William Peterfield Trent.

CALVIN.
Dr. Samuel Macauley Jackson.

CALVINISM.
Dr. Frank Hugh Foster.

CAMÕES.
Dr. Frederic Taber Cooper.

CANAAN and CANAANITES.
Professor Morris Jastrow.

CANADIAN LITERATURE.
Professor Wilbur Lucius Cross.

CANAL.
Mr. Charles Shattuck Hill.

CANON LAW.
Professor Dana Carleton Munro.

CANTICLES.
Professor Nathaniel Schmidt.

CAPILLARITY.
Professor Joseph Sweetman Ames.

CAPITAL.
Dr. Roland P. Falkner.

CARBONIFEROUS SYSTEM.
Professor Heinrich Ries.

CARICATURE.
Mr. Frank Fowler.

CARLYLE.
Professor Wilbur Lucius Cross.

CARTHAGE.
Professor James Morton Paton.

CASTE.
Professor A. V. W. Jackson; Dr. W J McGee.

CAT.
Mr. Ernest Ingersoll.

CATACOMBS.
Professor Arthur L. Frothingham.

CATALOGUING.
Dr. Melvil Dewey.

CATHEDRAL.
Professor Arthur L. Frothingham.

CATTLE and CATTLE PLAGUE.
Dr. Alfred Charles True.

CATULLUS.
Dr. George N. Olcott.

CAUSALITY.
Professor Evander Bradley McGilvary.

CAVALRY.
General Theophilus F. Rodenbough.

CAVE ANIMALS.
Professor Alpheus Spring Packard.

CAVOUR.
Professor Edwin A. Start.

CELIBACY.
Dr. Samuel Macauley Jackson.

CELL.
Professor Charles Benedict Davenport.

CELLINI.
Mr. Frank Fowler.

CENSUS.
Professor Roland P. Falkner.

CEPHALOPODA.
Mr. Gilbert Van Ingen.

CERVANTES.
Dr. Frederic Taber Cooper.

CEYLON.
Professor A. V. W. Jackson and others.

CHARITY ORGANIZATION SOCIETY.
Dr. Samuel McCune Lindsay.

CHAUTAUQUA.
Professor Paul Monroe.

CHICAGO.
Mr. Albert Robbins Sabin.

CHILD PSYCHOLOGY.
Professor Edward Bradford Titchener.

CHINESE EMPIRE.
Mr. Henry Gannett, Professor Edwin A. Start, Dr. William Elliot Griffis, Professor Alexander F. Chamberlain, and others.

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Dr. Albert Warren Ferris.

CHOPIN.
Mr. Gustav Kobbé.

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Professor Alfred Remy.

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Professor Morris Jastrow.

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Dr. William Elliot Griffis.

CICERO.
Dr. George N. Olcott.

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Professor George W. Kirchwey.

CIVIL CHURCH LAW.
Dr. George James Bayles.

CIVIL SERVICE REFORM.
Professor George W. Kirchwey.

CIVIL WAR IN AMERICA.
Dr. H. A. Cushing.

THE NEW INTERNATIONAL ENCYCLOPÆDIA

CAIRO, kī'rō (from Ar. *Masr el-Qāhira*, the victorious capital). The capital of Egypt and the largest city of Africa. It is situated near the right bank of the Nile, about nine miles above its bifurcation into the Rosetta and Damietta arms, 150 miles southeast of Alexandria and 80 miles west of Suez (Map: Egypt, E 2). It covers an area of 11 square miles divided into separate quarters named after the nationality of the inhabitants, and is surrounded by a low wall. Notwithstanding modern improvements, the Arabian quarters retain their Oriental character, the streets in that part of Cairo being narrow, crooked, and but few of them paved. The houses are mostly of stone, several stories high, and with window-lattices of wrought iron. The modern portion of Cairo, called Ismailieh, is extending westward. It is lighted by gas, has electric tramways, and is well laid out with broad avenues, fine squares, and a beautiful park on the Place Ezbekieh, occupying an area of over twenty acres and containing a number of gardens and amusement places. The Place Ezbekieh is the centre of modern Cairo, and around it are situated the principal theatres, hotels, and consulates.

The chief beauty and interest of Cairo lie in its numerous mosques, of which some are regarded as the best specimens of Arabic architecture. The Gami-ibn-Tulun, erected about 879, is the finest. It is square and surmounted by four minarets and a dome, and has a court with a fountain in the centre. The Gami Amra is the oldest in Egypt, but only a small portion of it is left. The Gami Sultan Hassan was begun in 1356, and, in point of splendor, stands foremost among the mosques of Cairo. It is cruciform in the interior, and contains a large number of pillars and beautiful hanging lamps. Its inner court has two fountains of singular beauty, and its dome is flanked by two minarets, the southern of which is said to be the highest in Egypt. Among other mosques may be mentioned that of Mehemet Ali, a structure of considerable architectural merit, recently built after Turkish models, with high minarets of alabaster. The mosque of Kait Bey dates from the Fifteenth Century. Cairo has a number of tombs of califs and Mamelukes, some of which are of great size and finely built. The obelisks, once so numerous, have disappeared, and now adorn various European and American cities. Among the palaces of Cairo is the vice-regal residence situated within the citadel; the beautiful palace of Gesireh in the northwestern part of the city, now converted into a hotel; and the palace of Addin in the centre of the city, frequently occupied by the Khedive. The bazaars of Cairo are extensive and well stocked, although inferior to those of Constantinople or Smyrna. The chief business street, Muski, has greatly decreased in importance. The citadel of Cairo is situated southeast of the city, and affords a fine view; its strategical importance is greatly detracted from by the fact that it is dominated by the Jebel Mokattam.

As an educational centre Cairo ranks high; its schools are attended by students from all parts of the Islamic world. Among its educational institutions the El-Azhar stands foremost, both in size and importance. It is situated in an old mosque, and is surrounded by numerous smaller buildings, used for the accommodation of the 10,000 students, of whom about 2000 live in the college. Its history can be traced as far back as 975, and it is considered the oldest university in the world. It has faculties of theology and jurisprudence, and is maintained chiefly by endowments, no tuition fee being charged. The members of the teaching faculties receive no compensation and are compelled to earn their living by private tuition or clerical labor.

The other educational institutions include schools of art and medicine, a veterinary and a polytechnical school, besides numerous missionary and Arab schools. The vice-regal library contains about 50,000 volumes, including a number of very rare copies of the Koran.

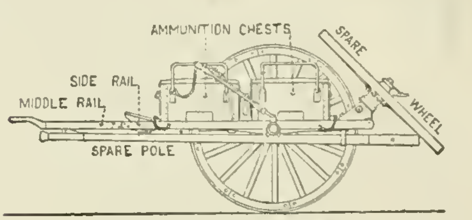
Cairo is the residence of the Khedive, and is the seat of administration of Egypt. It has also an international court and consular representatives from all important countries. The manufactures of Cairo include metal articles, textiles, essences of flowers, etc. There is railway communication with Alexandria, Damietta, Suez, El-Merg, Heluan, and Upper Egypt. The population of Cairo and its suburbs was 570,062 in 1897, consisting chiefly of Fellahin, Turks, Copts, and Arabs, together with Nubians, Berbers, Abyssinians, Jews, and over 20,000 foreigners.

Old Cairo or Fostat was founded in 640 by Amru, the conqueror of Egypt, on the site of his camp and near the old town of Babylon. It was the capital of the country till 973, when Gauhar, the general of the Fatimite Caliph Al Moez, founded to the north of Fostat the new town of Al Kahirah, the Victorious City; Saladin enlarged the boundaries of the town and surrounded it with walls. Throughout the Middle Ages Cairo was one of the chief centres of Mohammedan culture, and the emporium for the trade between Europe and the East. From 1798 to 1801 it was held by the French; it passed from them to the Turks, and through the Turks to Mehemet Ali, the founder of the present ruling dynasty. Though much of its former greatness has departed, Cairo is still one of the great capitals of Islam, and the life within its walls presents a picturesque blending of the buoyant European civilization, as represented by the English and French residents, with the dreamy mysticism of the Oriental world. Consult: Reynolds-Ball, *The City of the Caliphs* (Boston 1897); Penfield, *Present-Day Egypt* (New York, 1899); and Kemeid, *Cairo and Egypt* (London, 1899-1900).

CAIRO, kā'rō. A city, port of entry, and county-seat of Alexander County, Ill., at the junction of the Mississippi and Ohio rivers, 150 miles southeast of Saint Louis, on the Illinois Central, Cleveland, Cincinnati, Chicago and Saint Louis, and other railroads (Map: Illinois, C 6). The Ohio River is here crossed by a railroad bridge 2 miles long, and 58 feet above high water, which cost $2,500,000. Cairo has considerable manufactures, chiefly products of lumber, and has an extensive river trade, being an important market for the agricultural products of the Mississippi valley. It has a public library (A. B. Safford Memorial), a Government custom-house, and a United States marine hospital. Settled about 1837, Cairo was incorporated some 30 years later. It was expected to become a great commercial centre, and is the place described by Dickens in *Martin Chuzzlewit* as 'Eden'; but, until it was protected by levees, begun in 1857, it suffered from frequent inundations, the most disastrous of which occurred in 1858. During the Civil War large quantities of military supplies were stored here by the Federal Government. Cairo is governed under a general act of the State Legislature, passed 1872, with slight amendments since that time. The mayor, who is elected biennially, and the city council, chosen by wards, select the city marshal, tax collector, corporation counsel, health officers, policemen, etc. Other offices are filled by popular election. Population, in 1890, 10,324; in 1900, 12,566.

CAIROLI, kī'rō-lē, Benedetto (1825-89). An Italian statesman, born at Gropello, near Pavia. He was educated at the University of Pavia, which he left in 1848 to volunteer in the war against Austria, and from 1851 to 1859 lived in exile in Piedmont, when he again took up arms for Italian liberty, serving at the siege of Palermo, in the Trentino, and at Monterotondo and Mutino. Though he favored a republic, he was induced to accept the constitutional monarchy. After the accession of Humbert I. Cairoli became president of the Chamber, and was appointed Premier in March, 1878. This was the beginning of the period of personal and factional politics which have since been the bane of Italy. On November 17, as the King was driving into Naples, a certain Giovanni Passanante attempted to assassinate him with a poniard, but was prevented by Cairoli, who was in the carriage, and who received a severe wound, while King Humbert escaped with a mere scratch. In December, 1878, the Cairoli Ministry resigned. The Depretis Ministry, which succeeded, was in turn defeated in 1879 and the Left again came into power, under Cairoli, who was, however, forced to reconstruct his Cabinet the same year, and to bring in Depretis as Minister of the Interior. Finally, owing to the unpopularity of the policy pursued in regard to the French expedition to Tunis, the Ministry resigned in 1881. From that time until his death Signor Cairoli was conspicuous as a leader of the so-called 'historic' Left. Consult Lowell, *Governments and Parties in Continental Europe* (Boston, 1897).

CAISSON, kās'sōn (Fr., augment of *caisse*, chest, Eng. case). A four-wheeled vehicle or ammunition carriage, attached to batteries of field artillery. In horse or light field batteries there is usually one caisson to each gun, and in heavy field batteries two. The ammunition is carried in three chests, two of which are mounted on the body or caisson proper, and one on the limber. On the caisson are also carried a spare wheel and such tools and supplies as would be useful in any emergency or accident likely to cause delay. The limber of the caisson is similar to that provided for gun-carriages. See Artillery; Field Artillery; Limber.



U. S. FIELD-ARTILLERY CAISSON.

CAISSON. A floating gate with both ends alike, and resembling a short but very deep vessel, which is used to close the entrance to a dry dock. Its framing and plating resemble those of a ship, and it frequently contains a boiler and pumps for clearing it of water after being submerged. The term is also used, in a nautical sense, to designate a hollow floating structure for lifting ships. Caissons for this purpose are now generally made of steel, and are divided into compartments which can be separately connected with a pump. To operate a caisson it is first submerged to the required point, and then, having little or no buoyancy, it is drawn under the vessel to be raised or, with others, lashed to her with chains or ropes. The water is then pumped out, and the ship rises, supported by the caissons. Sectional floating docks, not now much used, consist of several caissons which are linked together to form a bed long enough to support a ship. In New York and in one or two other ports there are contrivances for lifting vessels called *screw-docks*. These consist of caissons which are sunk sufficiently to permit the vessel to pass over them. They are then emptied, and after they have lifted the vessel as far as their buoyancy permits, the caisson and vessel are raised by heavy screws in a side framework.

The pneumatic caisson used in hydraulic engineering consists of a steel box without a lower side, but with sides and top air-tight. It rests on the bottom, into which the sharp edges of its sides are forced by pressure or weight. To further assist in keeping the water out, an adequate air-pressure is maintained in it. The men who work in the caisson enter through air-locks which have air-tight doors on each side, so that very little pressure is lost. See FOUNDATION, and DOCK.

CAISSON DISEASE. A rare affection induced by remaining for any length of time in a caisson. The disease was first described by Pol and Watelle, in 1845. The symptoms are buzzing and pain in the ears, dizziness, loss of power in the legs, severe pain in the arms, legs, and shoulders, bleeding from the nose and lungs, and occasionally unconsciousness. The cause of the disease is uncertain. According to one theory, caisson disease is due to poisoning by carbonic acid. According to another theory, it is due to congestion of the internal organs with subsequent blood-stasis, resulting in possible blocking of the blood-vessels by small thrombi, followed in turn by a necrotic process. Finally, according to a third theory, the disease is due to increased solution by the blood of the compressed gases of the air (principally nitrogen and carbonic acid) and to their rapid liberation during decompression. Judging from the careful observations made in 1891 by Van Rensselaer, the second theory is probably nearest to the truth.

In the treatment of caisson disease, morphia, heat, stimulants, strychnine, and ergot are recommended. Returning to compressed air for a time, and then emerging very slowly, has benefited many sufferers. Preventive treatment may consist in securing the removal of carbonic acid from the air in the caisson and increasing the time spent in 'locking out' to one minute for every three pounds of pressure, a sudden transition from compressed air to the pressure of the atmosphere being quite dangerous. Above all, only perfectly sound men should be selected for work in caissons. Consult: Pol and Watelle, "Mémoire sur les effets de la compression de l'air," in *Annales d'hygiène publique et de médecine légale* (Paris, 1884); Oertel, "Handbuch der respiratorischen Therapie," in Ziemssen, *Handbuch der allgemeinen Therapie*, Band 1, Theil 4 (Leipzig, 1882); Smith, *The Physiological, Pathological, and Therapeutic Effects of Compressed Air* (Detroit, Mich., 1886); and Lloyd, "Effects of Compressed Air," in *Twentieth Century Practice*, Vol. III. (New York, 1895). See FOUNDATION.

CAITHNESS, kāth′nĕs. The northernmost county of Scotland. Its area is 686 square miles (Map: Scotland, E 1). The general aspect of Caithness is level and bare, it being in great part moorland and destitute of trees, while the seacoast is bold and rocky, with many bays, inlets, promontories, and caves. The chief crops are oats, barley, turnips, and potatoes. The occupants of the small farms divide their time between farming and herring, ling, cod, salmon, and lobster fishing. Wick, the county town, is the chief seat of the British herring fishery. Population, in 1801, 22,600; in 1851, 38,700; in 1891, 37,177; in 1901, 33,860.

CAITHNESS FLAGSTONE. A dark-colored bituminous schist, slightly micaceous and calcareous, valuable on account of its toughness and durability for pavements, cisterns, and various other purposes. Flagstones of this material are largely exported. They belong to the Devonian Old Red Sandstone, and contain abundant remains of fossil fishes. See DEVONIAN, and OLD RED SANDSTONE.

CA′IUS. The name assumed by Kent in Shakespeare's *King Lear*.

CAIUS, DOCTOR. A French physician in Shakespeare's *Merry Wives of Windsor*. He is in love with Anne Page, and elopes with a boy disguised in her clothes.

CAIUS, kēz, JOHN (1510-73). An English physician, the co-founder of Gonville and Caius College, Cambridge. His real name was Kay or Kaye, which he Latinized into Caius. He was born in Norwich, was educated at Gonville Hall, Cambridge, and, in medicine, at the University of Padua and elsewhere on the Continent, spending much time in search of accurate texts of Galen and Hippocrates. On his return he practiced with success at Cambridge, Shrewsbury, and Norwich. In 1547 he was elected a fellow of the College of Physicians, of which he was afterwards nine times elected president. He also became physician to Edward VI., Queen Mary, and Queen Elizabeth. He acquired much wealth from the practice of his profession and employed it in the encouragement of science and learning. In 1557 he refounded Gonville Hall, thereafter known as Gonville and Caius College. In 1559 he was chosen master, and, although he was a Roman Catholic, he retained the office under Elizabeth. His books number twenty-seven titles, including critical, antiquarian, and scientific works, the most famous of which is *A Boke of Counseill Against the Sweat and Sweatyng Sickness* (1552).

CAIUS COLLEGE. See GONVILLE AND CAIUS COLLEGE.

CA′IUS GRAC′CHUS. A tragedy by J. Sheridan Knowles, published in 1815 and produced at the Belfast Theatre, on February 13 of that year. Macready brought out a remodeled version on November 18, 1823, at Covent Garden.

CAIVANO, kī-vä′nō. A city in south Italy, five miles north of Naples, with which it is connected by a street railway (Map: Italy, J 7). The chief trade is in the grain, hemp, fruit, wine, and olives that grow in the vicinity. It was a place of considerable strength in the Middle Ages, and still retains remains of walls and towers. Population (commune), in 1881, 12,000; in 1901, 12,264.

CAIX, kä-ēks′, NAPOLEON (1845—). An Italian philologist. He was born at Bozzolo, near Mantua, and was educated in Cremona and Pisa. In 1869 he became professor of ancient languages at the Lyceum of Parma, and in 1873 professor of Romanic languages and comparative philology at the Institute of Higher Studies, Florence. The following are some of his numerous publications: *Saggio sulla storia della lingua e dei dialetti d'Italia* (1872); *Sulla lingua del contrasto* (1876); *Le origini della lingua poetica italiana* (1880), which work is generally considered his best.

CAJAMARCA, kä′hä-mär′kä. An interior department of Peru, in the northwestern part of the republic (Map: Peru, B 5). It has an area of 12,538 square miles, comprising a highly mountainous district which belongs to the basin of the river Marañon. Population, in 1896, 442,412. The department is noted rather for mineral wealth—principally gold, silver, copper, iron, and coal—than for animal or vegetable life. Cajamarca until 1854 formed part of the Department of Libertad.

CAJAMARCA, or **CAXAMARCA**, kä′hä-mär′kä (Quichua *ccassac*, *casac*, frost, ice + *marca*, place, town, referring to its severe climate). A city of Peru, capital of the department of the same name, situated on the east slope of the Andes, at an elevation of about 9000 feet above sea-level; 84 miles from the Pacific coast and 310 miles north by west of Lima (Map: Peru, B 5). It enjoys a moderate temperature; is laid out with broad streets crossing at right angles; and contains several plazas. There are two fine churches, secondary colleges for both sexes, a prison of modern construction, and the ruins of the palace of Astopilco, where Atahualpa, the last of the Incas, was killed in 1533 by Pizarro. Cajamarca is one of the oldest cities of Peru, and figured prominently at the time of the Spanish Conquest. Three miles to the east are hot sulphur springs known as the Incas' baths. The most important manufactures are steel articles, cotton and woolen goods, and straw hats. Population, about 12,000.

CAJ′EPUT (Malay *kāyā*, tree + *putih*, white), *Melaleuca leucadendron.* A tree of the order Myrtaceæ, from the leaves of which the pungent, aromatic, volatile oil called oil of cajeput is obtained by distillation. The cajeput-tree occurs from the Malay Peninsula to Australia, and is a tree 30 to 40 feet high and 2 feet in diameter, with a crooked trunk, papery bark, white wood (whence the name, cajeput), elliptical, lanceolate, alternate leaves, and terminal spikes of white flowers. The greater number of the species are natives of Australia, where more than a dozen well-marked species are known, some of them very beautiful shrubs and frequent ornaments of British hothouses. Much of the oil of cajeput of commerce is prepared from Melaleuca leucadendron, but volatile oils similar in many respects are distilled from the leaves of many other species. A hundred pounds of leaves yield slightly less than one pound of oil. It is maintained by some that the true oil of cajeput comes only from Melaleuca minor, but that species cannot be distinguished botanically from Melaleuca leucadendron. The oil contains a number of complex constitutents, as cajeputol, hydrocarbons, various ethers, etc. It is a stimulant, counter-irritant, diaphoretic, and antiseptic. In India it is used extensively as an external application for rheumatism. The oil is rather heavy, and usually is of a greenish tinge. The wood is hard, close-grained, and durable, especially when placed under ground. The bark is useful for packing, etc. In Australia these trees are known as tea-trees. Melaleuca axillaris produces a thin, spongy bark, that can be used for blotting and filter paper.

CAJ′ETAN (Lat. *Cajetanus*) (1469-1534). An Italian ecclesiastic, whose real name was Jacopo de Vio (in religion Tomaso), the name Cajetan being assumed by him from his birthplace Gaeta (Cajeta). At the age of 15 he entered the Dominican Order, studied for the next few years at Naples, Padua, and Ferrara (where he held his own in a public disputation with Pico della Mirandola), and in 1508 became general of his order. Leo X. made him a cardinal in 1517, and in the following year sent him to Germany to urge the Emperor and the Scandinavian kings to form a league against the Turks. While on this errand he was commissioned to examine Luther personally, and send him to Rome if need were. Luther appeared before him at Augsburg, but refused to retract his teaching on indulgences, and his breach with the Church was only widened by the discussion. In 1523 Cajetan was sent as legate to Hungary; but Clement VII., on his accession, recalled him to Rome, in order to make use of his theological knowledge and counsel. He was consulted on the divorce of Henry VIII., and decided unhesitatingly against it. He made a translation of the Old Testament, with a commentary, and wrote a treatise on the authority of the Pope, which was answered by the faculty of the University of Paris. He also wrote commentaries upon parts of Aristotle's writings, and upon the *Summa* of Aquinas. The latter is reprinted in the definitive edition of the great Aquinas issued under the patronage of Leo XIII. (q.v.) (Rome, 1882). He died in Rome, August 9, 1534. A collection of his works appeared at Lyons in 1639 (5 vols.); his life is prefixed. Consult, also, Schilbach, *De Vita ac Scriptis de Vio Cajetani* (Berlin, 1881).

CAJIGAL, kä′hê-gäl′, Francisco Antonio (1695-1777). A Spanish colonial governor, born in Santander, Spain. He was Governor of Santiago, Cuba, from 1738 to 1747, and in 1742, during the war between Spain and England, repelled an attack of Admiral Vernon (q.v.). In 1747 he was appointed Governor-General of Cuba, which position he held until 1760, establishing a navy-yard and arsenal at Havana during his term of office. From 1760 to 1761 he was a viceroy of Mexico *ad interim*, and afterwards, until his death, lived in Spain.

CAKCHIQUEL, käk′chê-käl′. An important tribe or nation, of Mayan stock, formerly holding the central districts of Guatemala, where their descendants still reside. The name is that of a native tree, and their language is a dialect of the Quiche. At the time of their conquest by Alvarado, about 1524, they had attained a high degree of culture, as is evidenced by their architectural remains, their calendar and hieroglyphic systems, and their native literary productions. They had an intense religious veneration for maize, and there is even reason to suppose that they were the first people to reclaim it from its original wild condition. The best compendium of their history and culture is Brinton's *Annals of the Cakchiquels.*

CAKES, The Land of. A title applied to Scotland, on account of the baps, scones, and oatmeal cakes which, with porridge, form the principal food of the country people. The epithet was prevalent in the Eighteenth Century.

CAKE-URCHIN. See Sand-dollar, and Sea-Urchin.

CAL′ABAR (OLD) RIVER. An estuary-like bay on the north side of the Bight of Biafra, which penetrates British Nigeria just west of the border line between it and Kamerun (Map: Congo Free State, A 2). It is about 10 miles wide, and extends inland nearly 25 miles. Near the head of the bay the waters of three rivers—the Cross, the Calabar, and the Akpa—are received through a deltoid border-land. The chief towns bordering the delta and estuary are Old Calabar, Duketown, and Creektown. The name Old Calabar is also applied to the region around the river, and now incorporated with British Nigeria.

CALABAR BEAN. The seed of *Physostigma venenosum*, a twining, half-shrubby plant, native of western Africa, of the natural order Leguminosæ, nearly allied to the kidney-bean, but of a genus distinguished by the hood-shaped stigma and the deeply furrowed hilum of the seed. The following are the leading characters of the bean itself: "About the size of a very large horse-bean, with a very firm, hard, brittle, shining integument, of a brownish-red, pale-chocolate, or ash-gray color. Irregularly kidney-shaped, with two flat sides, and a furrow running longitudinally along its convex margin, ending in an aperture near one end of the seed. Within the shell is a kernel, consisting of two cotyledons, weighing on an average about 46 grains, hard, white, and pulverizable, of a taste like that of the ordinary edible leguminous seeds, without bitterness, acrimony, or aromatic flavor. It yields its virtues to alcohol, and imperfectly to water." It is used in the form of an emulsion by the natives of Africa, as an ordeal when persons are suspected of witchcraft. It is believed that if one vomits them he is innocent: if they are retained and death occurs, he is guilty. If the accused person is innocent he will usually eat a large number without hesitation, and so cause vomiting; if he hesitates and takes little, this does not occur. In 1855 Dr. Christian very nearly fell a victim to his zeal for science in experimenting on some specimens of this bean which had been sent to Edinburgh by some African missionaries, dangerous symptoms having been produced by 12 grains of the kernel which he swallowed. In 1861 Dr. Thomas R. Fraser tried the effects upon himself of doses of 6, 8, and 10 grains. The general symptoms were epigastric uneasiness, great feebleness, dimness of vision, salivation, giddiness, and irregular, feeble, and slow heart's action. When placed on the eyeball, this substance contracts the pupil, decreases intraocular tension, and produces near-sightedness. In 1864 fifty children were poisoned by eating these beans, which were swept out of a ship at Liverpool. A boy aged 6 years, who ate six beans, died very speedily. The chief symptoms in these cases were griping, vomiting, and contracted pupils; the face was pale, the eyes bright and protruding, and in trying to walk the children staggered as if they were drunk. The bean contains two alkaloids—physostigmine, or eserine, which represents the chief activity of the drug; and calabarine, which has a tetanizing action like strychnine. It has been used medicinally, in small doses, in chorea, tetanus, and strychnine poisoning. It is employed to counteract the dilatation of the pupil caused by atropine, to lessen intraocular tension in glaucoma, and to alternate with atropine in breaking up adhesions in iritis. Being now a recognized medicinal agent, it is satisfactory to know that the dangerous and even fatal effects of excessive doses may be prevented by administering belladonna (nightshade), or its active principle, atropine. Belladonna has also an opposite action on the eye to that of this substance. When the pupil is contracted by Calabar bean, it may be dilated to its normal size or larger by belladonna; and when it is dilated by belladonna, it may be reduced to its normal size or smaller by Calabar bean; but the action of eserine is not as durable as that of atropine.

CALABASH GOURD (Fr. *calebasse*, Sp. *calabaza*, a dry gourd; cf. Pers. *kharbuz*, melon, Little Russ. *harbuz*, pumpkin, watermelon), or Bottle Gourd (*Lagenaria vulgaris*). A climbing annual plant of the natural order Cucurbitaceæ, cultivated in tropical countries. The angular leaves and the thin stem of the plant feel sticky to the touch, and have a disagreeable odor. The odor of the white flowers resembles that of musk. The hard rind of the bottle-shaped fruit, called calabash, is much used in tropical countries for holding liquids. The pulp of the common bottle gourd is worthless, and cannot be used as an article of food. Other varieties of Lagenaria, however, bear an edible fruit, which is sometimes sweetened with sugar and offered for sale. For illustration, see Plate under Cucumbers.

CALABASH-TREE (*Crescentia cujete*). An evergreen tree found in the West Indies and in the tropical parts of America, belonging to the order Bignoniaceæ. In height and size it resembles an apple-tree, and has broad, lanceolate leaves, tapering to the base; large, whitish, fleshy flowers scattered over the trunk and older branches; and a gourd-like fruit, sometimes a foot in diameter. The wood of the tree is tough and flexible, and is well adapted for coachmaking. The most useful part is the hard shell of the fruit, after the outer skin is removed. Under the name of calabash, it is much used, in place of bottles, for holding liquids, and for goblets, cups, water-cans, etc. These shells may even be used as kettles for boiling liquids. They are sometimes highly polished, carved with figures, tinged with various colors, and converted into ornamental vessels. The rinds of gourds are sometimes similarly used and called calabashes.

CALABAZAR, kä'lȧ-bȧ-thär′. An inland city of Cuba, in the Province of Santa Clara, about 20 miles north by east of Santa Clara. It has a fine parish church and a pretentious municipal building. Population, in 1899, 1575; municipal district, 13,419.

CALABOZO, kä'lȧ-bō′sō (Sp., dungeon). A town in Venezuela, capital of the State of Miranda, about 120 miles south-southwest of Carácas (Map: Venezuela, D 2). It is situated on the Guárico River, in the fertile grazing region of the great plains, and is an important commercial centre, with a trade in live stock, hides, cheese, timber, etc. Calabozo is the see of a bishop. The climate in this vicinity is excessively hot, and inundations are not infrequent. Calabozo was a humble native village until the early years of the Eighteenth Century, having been founded in 1730. Population, about 6000.

CALA′BRIA (Gk. Καλαβρία, *Kalabria*). The southernmost peninsula of Italy, having the Ionian Sea and the Gulf of Taranto on the east, and the Tyrrhenian Sea on the west (Map: Italy, L 8). Its area is 5819 square miles. The surface is very mountainous, the peninsula being traversed through its entire length by the Apennine Mountains. Owing to its elevated surface, Calabria has a moderate and healthful climate. The flora is extremely rich and varied. The mountain slopes are covered with extensive forests of pine, oak, beech, and numerous other trees, interspersed with vineyards and olive gardens. Grain, rice, southern fruit, hemp, and flax are raised and exported in considerable quantities, and the raising of domestic animals is extensively engaged in by the inhabitants. Of mineral products, Calabria yields marble, alabaster, gypsum, salt, and some copper. The province is purely agricultural, the manufacturing industries being only slightly represented. There are very few large towns, and the railway lines run chiefly along the coast. For administrative purposes, Calabria is divided into the three provinces of Catanzaro, Cosenza, and Reggio di Calabria, with a total population of 1,366,982 in 1900. The Calabrians are mostly plain folk, quite superstitious, and generally ignorant.

In Roman times the name Calabria was given to the southeastern peninsula of Italy, nearly corresponding to the modern Province of Lecce, no portion of which is included in modern Calabria, which answers to the ancient Bruttium. The name Calabria, as applied to the district now known by that name, appears to have originated with the Byzantines some time prior to the conquest of the country by the Normans. Before the unification of Italy Calabria constituted a province of the Kingdom of the Two Sicilies.

CALA′DIUM (Neo-Lat.; possibly from Scotch *kale*, *kail*, cabbage—a variant of *cole*). A genus of aroid plants related to Arum. There are about a dozen species, and numerous varieties that are cultivated in hothouses for their large, beautifully variegated, arrow-shaped leaves. They are closely allied to the Colocasias, which, in addition to being highly ornamental bedding plants, furnish the Taro (q.v.) of the Pacific islands. See ELEPHANT'S-EAR.

CALÁGANE, kȧ-lä′gȧ-nȧ. A Malayan people on Dávao Bay, Mindanao. See PHILIPPINES.

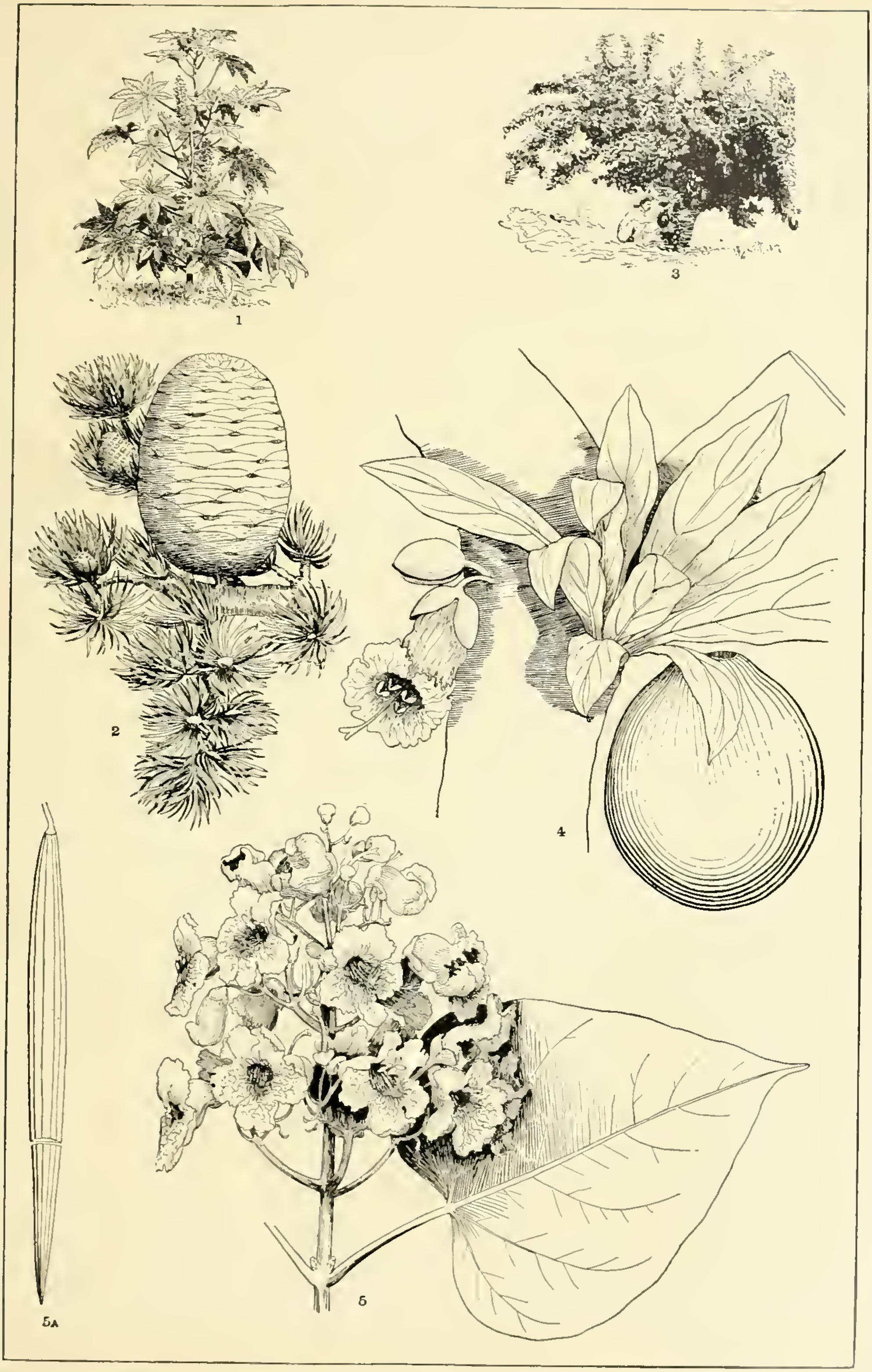
CA′LAH. An Assyrian city mentioned in Gen. x. 12, and no doubt identical with Kalchu, which frequently occurs in the Assyrian inscriptions as the name of an important city. According to Asurnazirpal (B.C. 885-60), Calah was built by Shalmaneser I. (c.1250). It was rebuilt by Asurnazirpal in B.C. 880. He adorned it with a massive wall on the northern side, beautiful gardens along the banks of the Tigris, lofty temples, and huge palaces. In one of these palaces was found the 'black obelisk,' recording the tribute paid by "Jehu, the son of Omri," to Shalmaneser II. (860-25). Building operations were carried on in Calah by Shalmaneser I., Asurnazirpal, Shalmaneser II., Tiglathpileser III. (745-28), Sargon (722-05), Esarhaddon (681-68), and Ashar-itil-ilani-ukin (626-?). The largest zikkurat was 167 feet square and 140 feet high, and had seven stages. During a number of reigns Calah was the residence of the Court, but in population it probably never equaled Nineveh, or even Ashur. It was the city that Layard discovered at Nimrud, 20 miles south of Koyunjik, when he supposed that he had found Nineveh. Since no tablets have been found at Nimrud, it has been assumed that Sennacherib (705-681) removed the temple library to Nineveh. Consult: Layard, *Nineveh and Its Remains* (London, 1875); G. Smith, *Assyrian Discoveries* (London, 1875); id., *Chaldean Account of Genesis* (London, 1875); Winckler, *Geschichte Babyloniens und Assyriens* (Leipzig, 1892); Rogers, *History of Babylonia and Assyria* (New York, 1901).

CALAHORRA, kä′lȧ-ōr′rȧ (anciently, Lat. *Calagurris*, later *Kalatharral* of the Saracens, from Ar. *Kalat*, castle, and *harral*, stone). A town of Spain, in the Province of Logroño, Old Castile, 24 miles southeast of the city of Logroño, situated on the small river Cidacos, about 2 miles from its confluence with the Ebro (Map: Spain, D 1). It is the seat of a bishopric, and the cathedral is the principal building. The town has a brisk trade in local agricultural products. Population, in 1897, 9500. Calahorra occupies the site of the ancient Calagurris, celebrated in classic history for the obstinate but unsuccessful resistance it offered (B.C. 78) to Afranius, Pompey's legate, when the citizens slaughtered their wives and children for food rather than surrender. Calahorra was the birthplace of Quintilian, the rhetorician.

CALAIS, kăl′ĭs. A city and port of entry in Washington County, Maine, 120 miles east by north of Bangor, on the Saint Croix River, at the head of tidewater, and opposite Saint Stephen in New Brunswick (Map: Maine, J 5). The most northeasterly seaport in the United States, it is the terminus of the Saint Croix and Penobscot Railroad, and has railroad communication also by the Canadian Pacific through Saint Stephen, with which it is connected by an international bridge. The river furnishes abundant water-power, to which is due the great lumber trade of the city. Ship-building is also an important industry, and there are foundries, machine shops, marble and granite quarries, and manufactures of shoes, calcined plaster, woolen goods, etc. The city contains a public library of 7500 volumes, Calais Academy, and Memorial Park. Pierre du Guast, Sieur de Monts, who in 1605 founded at Port Royal the first French settlement in Canada, spent the winter of 1604-05 on Big Island, within the present city limits. Calais was settled in 1779, incorporated as a town in 1809, and chartered as a city in 1850. It was nearly destroyed by fire in August, 1870. The government is administered under a charter of 1883 (revised 1901), which provides for a mayor, elected annually, and a city council, which elects heads of all departments. Population, in 1890, 7290; in 1900, 7655. See I. C. Knowlton, *Annals of Calais* (Calais, 1875).

CALAIS, kȧ′lâ′ (Med. Lat. *Calailia*, *Caluisis*). A seaport town and fortress of the first class in the Department of Pas-de-Calais, France, on the Strait of Dover, near its narrowest part, the distance from the town of Dover, England, not being more than 18 miles (Map: France, H 1). On the south and east, low, marshy grounds, which can be laid under water for the defense of

CALABASH, ETC.



1. CASTOR OIL PLANT (*Ricinus communis*).
2. CEDAR OF LEBANON, CONE AND FOLIAGE (*Cedrus Libani*).
3. CALABASH TREE (*Crescentia cujete*).
4. FRUIT OF CALABASH TREE.
5. CATALPA OR INDIAN BEAN TREE (*Catalpa bignonioides*).

5a. CATALPA FRUIT OR INDIAN BEAN.

the city, extend almost to the walls. The town, adjacent country, and port are commanded by the citadel, which is situated at the west end of the town, while seven forts, by their cross-fire, defend the weakest points. The harbor, which was formerly shallow, has been greatly improved, has a light-house 190 feet high, and a port accessible to the largest vessels. As one of the chief ports of debarkation for travelers from England to France, it has frequent steam communication with Dover and London. The city is square in form; its streets are, for the most part, broad and well paved; and its ramparts form pleasant promenades. Among its objects of interest, the most noticeable are the Church of Notre Dame, the old Hôtel de Ville, and the Hôtel de Guise. It has become a manufacturing town of some importance. The chief manufactures are bobbinnet (tulle), machine-made lace, hosiery, etc. A number of mills produce silk, wool, cotton, and linen goods, and hats and gloves are extensively made. Calais has also distilleries, salt-refineries, and shipyards. Calais sends numerous boats to the herring and cod fisheries on the coasts of Scotland and Iceland. Its exports consist of eggs, corn, wine, brandy, etc., and it is the entrepôt for the produce of the district. It also does a large business in petroleum. In 1873 a school of artillery was established in Calais. It has an abundant water-supply, brought from the neighborhood of Guines. Population, in 1896, 56,940.

In the Ninth Century Calais was a small fishing village. In the following century it was much improved by Baldwin IV., Count of Flanders, and enlarged and strengthened by the Count of Boulogne. In 1347, after a long siege, it was captured by Edward III. of England, whose hard terms, and the self-devotion shown by six of the citizens, who were saved by Queen Philippa, form one of the most interesting passages of history. The English retained it until 1558, when it was captured by the Duke of Guise, since which time (with the exception of two years, 1596-98, when it was in the possession of the Spaniards) it has remained in French hands. Consult: Calton, *Annals and Legends of Calais* (London, 1852); P. W. T., "Modern Calais," in *Nautical Magazine*, Vol. LXVII. (London, 1898).

CAL′AÏS and **ZETES**, zē′tēz. In Roman mythology, the two winged sons of Boreas. They took part in the Argonautic expedition, during which they rescued the blind King Phineus from the attacks of the Harpies. They were said to have been slain by Hercules on the island of Tenos, where their graves were shown.

CAL′AMAN′DER WOOD. See Ebony.

CAL′AMARY (Neo-Lat. *calamarius*, from Lat. *calamus*, reed, pen). An Anglicized form of a European name for certain squids, given in allusion to the feather-pen-like internal shell, often called a calamary. Pen-and-ink fish is another and similar name. See Squid.

CALAMATTA, kä′lȧ-mät′tȧ, Luigi (1802-69). An Italian engraver. He was educated in Rome, but spent much time in Paris. In 1837 the Belgian Government commissioned him to found and direct a school of engravers in Brussels, where he had such pupils as Gustave Biot and Leopold Flameng. He is best known, perhaps, by the engraving of the head of Napoleon. Among his numerous works are engravings of Ary Scheffer's "Francesca da Rimini;" "La Gioconda," after Leonardo da Vinci; a portrait of George Sand, from life; and the "Madonna della Sedia" of Raphael. He spent his last years as professor of drawing in the Academy of Milan. His engravings are remarkable for correctness and exquisite finish.

CALAMBA, kȧ-läm′bȧ. A town of Luzon, Philippines, in the Province of Laguna. It lies 27 miles west of Santa Cruz, and is connected by roads with several towns of the province. It has a telegraph station. Population, in 1898, 11,480.

CALAMBUCO, kä′lȧm-bōō′kō (Sp., probably from Pers. *kalambak*, fragrant wood). A tree found in the northern part of the island of Luzon, and considered superior to teak or live oak for ship-building. It is dark and hard, like teak, and is proof against the destructive white ant of the Malay region. Warlike, mechanical, and agricultural tools and implements are made from it. The aloes-wood is produced by *Aquilaria agallocha*, a large tree with heavy wood, shaded with green. It is aromatic, and is burned as incense. Diseased specimens of this and another species are said to yield the eagle-wood. It is possible that calambuco is a product of the same or related species.

CALAME, kȧ′läm′, Alexandre (1810-64). A Swiss landscape painter. He was born in Vevey, and studied in Geneva with Diday, whose successor as head-master of the art school he afterwards became. In 1842 he exhibited in Paris the pictures entitled, "Mont Blanc;" "Jungfrau;" "Lake of Brienz;" and "Pass of Monte Rosa" (now in the Leipzig Gallery). He settled in Geneva, where he lived until 1863, and where a monument was dedicated to his memory, April 3, 1880. He was one of the best landscape painters of his day, and the best depicter of Alpine scenery. Besides the pictures already mentioned, and his numerous fine lithographs and etchings, Calame produced the following works: "Bernese Oberland" (Leipzig Gallery); "Pass of Monte Cervino" (ib.); "Ruins of Pæstum" (ib.); "Schreckhorn" (Basel Museum); "Wetterhorn" (ib.); "Waterfall Near Meiringen" (Berne Gallery); "Lake of Lucerne" (Berlin Museum); "The Four Seasons" (Geneva Museum); "The Four Divisions of the Day" (Basel Museum); "Lake of the Four Cantons" (ib.).

CALAMIANES, kä-lä′mē-ä′nȧs. A group of islands in the western part of the Philippine Archipelago, in latitude 12° N. and longitude 120° E., situated between the islands of Mindoro (from which it is separated by Mindoro Strait) and Palawan (Map: Philippine Islands, D 7). The principal islands are Busuanga and Calamian. They are all hilly more or less, but have a very fertile soil, yielding tropical fruits in abundance. There are some gold and iron deposits. The climate is hot and unhealthful. During the Spanish régime the Calamianes, together with the Cuyos group and the northern part of Palawan, formed the Province of Calamianes, with an area of 340 square miles and a population of 20,000.

CALAMIANO, kȧ-lä′mē-ä′nō. A Visayan dialect mixed with Tagalog, spoken in northern Palawan and the Calamianes Islands. See Philippines.

CAL′AMINE (Fr., from Med. Lat. *calamina*, corrupted from Lat. *cadmia*). A hydrated zinc silicate that crystallizes in the orthorhombic system. The name was originally applied to mineral zinc carbonate, but this is now known as *smithsonite*, while *calamine* is restricted exclusively to the silicate. It occurs massive or crystalline, often in mammillary, botryoidal, and fibrous forms, generally white, although sometimes with a bluish or greenish shade, and less frequently yellowish to brown. Calamine is found in Germany, Austria, in Derbyshire, England, and at various localities in New Jersey, Pennsylvania, and elsewhere in the United States. When pure it contains 52 per cent. of zinc, and is therefore a valuable ore of, that metal.

CALAMINT (Lat. *calaminthe*, Gk. καλαμίνθη, *kalaminthē*, from καλός, *kalos*, beautiful + μίνθη, *minthē*, mint), *Calamintha*. A genus of plants of the order Labiatæ, nearly allied to balm (Melissa). The common calamint (*Calamintha officinalis*) is not infrequent in England. It has whorls of flowers on forked, many-flowered stalks, and crenate leaves with an agreeable aromatic odor. It is used to make herb tea, and as a pectoral medicine. A number of species to which similar virtues are attributed are found in the United States. Two or three species of shrubby calamints are sometimes planted in borders of flower-gardens. See Balm.

CAL′AMIS (Gk. Κάλαμις, *Kalamis*). A sculptor of Greece, who flourished in the second quarter of the Fifth Century B.C. His works were widely scattered throughout Greece, but nothing definite is known as to the course of his life. He may be regarded as the representative artist of the transition period between the archaic art before the Persian wars and the art of Phidias. No works of Calamis have come down to us, though attempts have been made to identify several pre-Phidian types with some of his celebrated works.

CALAMITES, kăl′ȧ-mī′tēz (Gk. καλαμίτης, *kalamitēs*, reed-like, from κάλαμος, *kalamos*, reed). A genus of fossil plants, appearing first in the Devonian rocks, and rising through the intermediate formations to the Jurassic, where it is represented by a single species. They reach their maximum development in the coal-measures, where a large number of species have been determined. The tall, straight stems rose from a swampy clay soil in profusion in the forests of sigillaria, and formed a striking and characteristic feature of the coal flora, though they supplied little material for the structure of coal. They are hollow-jointed cylinders, with longitudinal furrows, giving the fossil the appearance of equiseta. From this resemblance, botanists have generally considered them as huge 'horse-tails.' They belong to the equiseta, and the study of many specimens, both macroscopically and microscopically, has developed a number of sub-genera. The modern 'horse-tail rush' represents, according to Seward, a degenerate type of the calamitean group. Hooker was unable to detect any traces of structure, in carefully prepared specimens, or the presence of those siliceous stomata which characterize equiseta, and which should have been preserved in the fossil state; but later investigators have been more successful in finding specimens from which internal structures could be determined. Fleming has shown that the furrows are markings on the interior cavity. The lower portion of a calamites trunk would show rings of scars where branches had fallen off, while higher up the younger branches contained whorls of slender leaves and long, slender cones. The root termination was conical, the joints increasing upward in size and length. The foliage of calamites has been described under different names. *Asterophyllites* includes jointed and fluted stems, with branches proceeding from the joints, and bearing long, pointed leaves. *Annularia* has closely arranged leaves, while in *Sphenophyllum* the leaves were wedge-shaped. See Coal; Carboniferous System.

CALAMITIES OF AUTHORS, The. See Disraeli, Isaac.

CAL′AMUS. See Rattan, and Dragon's-Blood.

CALAMUS (Lat., Gk. κάλαμος, *kalamos*, reed; cf. AS. *healm*, Engl. *haulm*). A word applied not only to the reed, but also to objects made from it, and especially to the ancient pen, which was commonly a split reed. Egypt furnished most of these reeds, though those from Cnidus were also highly esteemed. They were trimmed and split with a knife like a quill pen, and were generally kept in a case. Imitations of the reed pens in bronze have been found. Reed pens are still used in the East, the Arabic word being *Kalâm*. The same name is also applied to the reed pipe, or pastoral flute. See Syrinx.

CALAMUS. A name sometimes given to the sweet flag (*Acorus calamus*). See Acorus.

CAL′AMY, Edmund (1600-66). An English divine. He was born at Walbrook, February, 1600; studied at Pembroke Hall, Cambridge, where he attached himself to the Calvinistic party; and afterwards became domestic chaplain to the Bishop of Ely. In 1626 he was appointed lecturer at Bury Saint Edmunds, but resigned his office in 1636, when the order to read the *Book of Sports* began to be enforced. In 1639 he was chosen minister of Saint Mary, Aldermanbury, London. He now entered warmly into the controversies of the time, and became noted as a leading man on the side of the Presbyterians. He had a principal share in the composition of *Smectymnuus*, a work intended as a reply to Bishop Hall's *Episcopacie by Divine Right* (London, 1640), and one of the most able and popular polemics of the day. Like the mass of the Presbyterian clergy, he was monarchical and not republican in his political opinions. He disapproved, therefore, of the execution of Charles, and the Protectorate of Cromwell, and did not hesitate to avow his attachment to the royal cause. He was one of the deputies appointed to meet Charles II. in Holland and congratulate him on his restoration. His services were recognized by the offer of a bishopric, which he refused from conscientious scruples. He took part in the Savoy Conference (1661), but was ejected from his living by the Uniformity Act (1662); for venturing to preach in his church (December 28, 1662), he was cast into prison, but Charles II. secured his release. He died in London October 29, 1666. Two of his sons were educated for a religious profession: the one, Rev. Dr. Benjamin Calamy, became a High Churchman, and wrote *A Discourse About a Scrupulous Conscience*; the other, Edmund Calamy, was ejected for non-conformity, and had a son, also named Edmund

(1671-1732), who acquired reputation as the biographer of the ejected clergy. He was born in London, April 5, 1671, educated among the Dissenters and in Holland (1688-91); was pastor in London, 1692, and died there June 3, 1732. He was held in high regard, and his *Nonconformists' Memorial* (1778), as it is now called, a book which underwent important changes while in the author's hands, is the best source of knowledge respecting the 2000 ministers ejected from the Church of England by the Act of Conformity. Consult Palmer, *Abridgment of Nonconformists' Memorial* (London, 1802-03), and his autobiography, *Historical Account of My Own Life* (London, 1830).

CALANCHA, kȧ-län′chȧ, ANTONIO DE LA (1584-1654). A Peruvian chronicler. Early in life he entered the Augustinian Order at Lima, and afterwards traveled extensively through Peru for the purpose of examining the ancient ruins of that country and of recording its traditions. As a chronicler of the Augustins at Lima he wrote the important history (completed in 1633), which has been translated into French, under the title *Histoire de l'église du Pérou aux antipodes et d'un grand progrès de l'église en la conversion de Gentils par la prédication des religieux ermites de l'ordre Saint-Augustin* (1653).

CAL′AND, or **KALAND**. A brotherhood of Roman Catholics devoted to charitable and devotional works, dating from the Thirteenth Century, and of considerable extent in Germany, Switzerland, and France. It degenerated so far that it was suppressed before the Reformation, its property being confiscated for public purposes.

CALANDO, kȧ-län′dō̇ (It., slackening, from *calare*, to lower, diminish, decrease). A musical term which means diminishing by degrees in power (from forte to piano) as well as in rapidity, thus combining both the *decrescendo* or *diminuendo* (q.v.) and *ritardando* (q.v.) effects, but in a somewhat slighter degree.

CALANDRA, kȧ-län′drȧ, GIOVANNI BATTISTA (1586-c.1648). An Italian mosaicist, born in Vercelli. During the Pontificate of Urban VIII. it was discovered that dampness had begun to affect the paintings in Saint Peter's. It was considered advisable to replace certain of the pictures by copies in mosaic, and Calandra was the first to employ this art, afterwards brought to a much greater perfection by Christofori. He copied the "Saint Michael" of Cesari d'Arpino, and the four doctors of the Church by d'Arpino, Sacchi, Romanelli, and others.

CALANDRELLI, kä′lȧn-drĕl′lē̇, ALEXANDER (1834—). A German sculptor, born in Berlin. He studied at the Academy in that city in 1847, and afterwards took a course with Friedrich Drake and August Fischer. His important works are decorative designs for the city hall of Berlin; a bronze relief, typifying the Danish War ("Statue of Victory", ib.); "Monument of Victory" (fifth municipal district, ib.); a marble statue of Cornelius (entrance-hall of Berlin Museum); an equestrian statue of Frederick William IV. (entrance to National Gallery, Berlin); an equestrian statue of Emperor William I. (Bromberg); a statue of the Elector Frederick I. (Siegesallee, Berlin).

CALANDRINO, kä′lȧn-drē′nō̇. An unfortunate character in Boccaccio's *Decameron*, the story of whose mishaps creates great amusement.

CALANDRONE, kä′lȧn-drō′nȧ (It.). A small variety of clarinet used by the Italian peasants, on which they play simple melodies, and also sometimes accompany their national songs. It has the holes of the common flute, but the intonation is produced as in the common pipe.

CALAN′THA. The heroine of Ford's *Broken Heart*, daughter of King Amyclos of Laconia. She dies suddenly after being told of the deaths of all whom she holds dear. The scene of the announcement is a ballroom, and the episode has been strongly condemned by Hazlitt as 'unnatural.'

CAL′ANUS (Gk. Κάλανος, *Kalanos*, from Skt. *kalyāṇa*, 'the fortunate'). A Hindu philosopher, apparently a Brahman ascetic, whose real name, according to Plutarch, was Sphines. He was for some time in the camp of Alexander the Great at the invitation of the conqueror, but having become seriously ill, he was burned alive at his own request at Persepolis.

CALAPAN, kä′lȧ-pän′. The capital of the island of Mindoro, Philippines, situated at the northeastern extremity of the island. It has a harbor and a fort. Population, in 1898, 5585.

CALAPE, kȧ-lä′pȧ. A town of Bohol, Philippines, situated on the western coast, 26 miles north of Tagbilaran. Population, in 1898, 10,000.

CALAS, kȧ′lȧs′ *or* kȧ′lȧ′, JEAN (1698-1762). A Protestant merchant of Toulouse, whose judicial murder was the cause of an agitation in which Voltaire took the leading part. It resulted in the amelioration of the legal position of Protestants in France, and particularly discredited the administration of justice under the declining monarchy. Calas was accused of murdering his son because he wished to become a Roman Catholic. The son had probably committed suicide, and there was no evidence to support the accusation, which originated in a mob, and was fostered by Roman Catholic religious societies, the White Penitents, and the Franciscans, who treated the suicide with the honors due to a martyr. After a trial which lasted a whole winter, the Parliament of Toulouse, by a majority of eight to five, condemned Calas to death on the rack and confiscated the estate of the family. Calas's widow made Voltaire's acquaintance in Switzerland, and he actively took up her cause. After long labor he secured a rehearing of the case and the Parliament of Paris declared Calas innocent and restored the estate to the family. The chief magistrate was degraded and fined. Consult Coquerel, *Jean Calas et sa famille* (Paris, 1858); and for Voltaire's part in the matter, Kreiten, *Voltaire* (Freiburg, 1878).

CALASIAO, kȧ-lä′sē̇-ä′ō̇. A town of Luzon, Philippines, in the Province of Pangasinan, 9 miles southeast of Lingayen. Population, in 1898, 13,750.

CALATAFIMI, kȧ-lä′tȧ-fē′mē̇. A city of Sicily, 57 miles southwest of Palermo (Map: Italy, G 10). On a hill beside the town, and 1115 feet above the sea, is the castle, of Moorish design, now used as a prison. From it is a splendid view of the Temple of Segesta (q.v.) and of a mountainous landscape. The town had its name, Kalat al-Fimi, from the Saracens, who captured it in 828. In 1860 Garibaldi won his first victory over the Neapolitan troops on a field 2 miles to the southwest, marked by a monument erected in 1892. The cheeses of the district have more than a local reputation. Population (commune), in 1881, 10,000; in 1901, 11,426.

CALATAYUD, kȧ-lä'tȧ-yōōᴅ' (Ar. *kalat*, castle + *Ayub*, a Moorish king). A city of Aragon, Spain, situated on the Jalón, near its junction with the Jiloca, about 48 miles southwest of Saragossa (Map: Spain, E 2). It is built at the base of two rocky ridges, 1700 feet in height, out of the ruins of ancient Bilbilis, which lay about 2 miles to the east. The city is divided into a new and old portion, the former with several fine streets and handsome squares, while the latter is composed of mean buildings and narrow, crooked streets. Calatayud has ruins of a noble Moorish castle, two collegiate churches, and a Dominican convent. It manufactures silk, linen, and hempen fabrics, woolens, paper, leather, etc., and carries on a trade in agricultural produce. Population, in 1897, 10,900.

CALATRAVA, kä'lȧ-trä'vȧ. A military and religious Order in Spain, instituted in 1158, in the reign of Sancho III. of Castile. It received the town of Calatrava as a perpetual gift, on condition that it should defend it against the Moors. The Order was confirmed by Pope Alexander III., in 1164, and very soon came to render effective service in the wars against the Mohammedans. While the Christian States in Spain were exhausting themselves by internal strife, the Order of Calatrava was the main bulwark against the Moors. In 1197 the latter captured Calatrava and the knights removed to Salvatierra. In 1212, however, they not only recovered Calatrava, but had an important share in the deadly blow which was struck at the power of the Almoravides. In 1213 Calatrava united with the Order of Avis. The power of the Knights of Calatrava was shown at the time they joined the Orders of Alcántara and Santiago in exacting from Alfonso XI. a guarantee of their liberties and customs. The later history of Calatrava is a series of civil wars between the grand masters, which became so troublesome to the Government that Ferdinand and Isabella, in 1487-88, prohibited a new election and secured the grand-mastership to the Crown by a Papal bull in 1493. Later Charles V. made the Order perpetual, with the King of Castile as head. In 1808 Calatrava became an Order of merit. On March 13, 1872, the Order was suppressed by the republican Government, but was reorganized by Alfonso XII., June 13, 1874. Those who entered the Order took the vows of poverty and obedience. At first marriage was forbidden, but Paul III. in 1540 made this concession, and gradually the Order lost most of its religious character. The original garb was black, but in 1396 Benedict XIII. (antipope) allowed the knights to adopt the red cross. The present dress is a mantle of white, decorated with a red cross, cut out in the form of lilies.

CALATRAVA, José María (1781-1846). A Spanish statesman, born at Mérida. He became known as an eminent orator of the Liberal Party, and became a member of the Junta of Estremadura in 1808 and of the General Junta in 1810. Because of his radical views he was exiled upon the restoration of Ferdinand VII., in 1814, but returned to Spain after the King's deposition. In 1821 he was elected to the Cortes, and in 1823 he became Minister of Justice, but when, through the intervention of the French, Ferdinand regained absolute power (1823), Calatrava was again banished. He lived in London until 1830, when he returned to Spain, became Minister of Foreign Affairs (1836), and was prominent in the parliamentary movement which resulted in the adoption of the more liberal Constitution of 1837. When Queen Isabella assumed the Government, in 1843, he was made a Senator.

CALATRAVA LA VIEJA, lä vyā'ʜȧ (Sp., Calatrava the Old, from Ar. *kalat*, castle + *Rabah*, a man's name), or Old Calatrava. A ruined city of Spain, near Valdepeñas, situated on the Guadiana. In the Middle Ages it was a strongly fortified place; but nothing now remains save a single tower. Calatrava la Vieja was captured from the Moors by Alfonzo VIII. of Castile, and given to the Templars; unable to defend it, they returned the gift to Sancho III. (1157). Raymond, Abbot of Fitero, and Diego Velasquez here instituted the Order of Calatrava (q.v.) in 1158. In 1197 the Moors captured Calatrava la Vieja, but it was retaken in 1212. About 1217 the Knights of Calatrava la Vieja built a convent in the neighborhood, naming the place Calatrava la Nueva (New Calatrava).

CALAUA, kȧ-lä'wȧ, or **CALAWA**. A Malay people in northern Luzon. Their speech is mixed. See Philippines.

CALAVERAS (kăl'ȧ-vā'ras) **GROVE**. The nearest to San Francisco of the California groves of big trees. The grove is 70 by 1100 yards in extent, and contains about 100 of the big trees, of which the "Keystone State," the highest now standing, has an altitude of 325 feet and a circumference of 45 feet. The "Mother of the Forest" is 61 feet, and the "Father of the Forest," not standing, is 112 feet in circumference. The grove is State property under a commissioner.

CALAVERAS RIVER. A small river of central California, and a tributary of the San Joaquin, which it joins just below Stockton (Map: California, C 2). It rises in the Sierras of Calaveras County and pursues a southwesterly course.

CALAVERAS SKULL. A much-discussed human cranium reported to have been found in auriferous gravels below lava-beds near Angel, Calaveras County, Cal. The specimen was described by J. D. Whitney, and is preserved in the Peabody Museum, Harvard University. Satisfactory accounts of the object and its associations have been published by Holmes in the *Smithsonian Report* for 1901 and elsewhere. See Archæology, American.

CALBAYOG, käl'bȧ-yōg'. A town of Samar, Philippines, situated on the western coast, 12 miles northwest of Catbalogan. Population, in 1898, 30,250.

CALBUR'GA. See Gulbarga.

CALCAIRE GROSSIER, kȧl'kâr' grō'syȧ' (Fr., coarse limestone). The middle Eocene stage of the Tertiary system of France. The strata of which it is composed are almost wholly limestones, and they outcrop in great force in the Paris basin. They have been subdivided into lower, middle, and upper sub-stages, the first and third being fresh-water deposits, and the second of marine formation. The strata are highly fossiliferous: the animal remains include mammalia, reptiles, and a large variety of lower life-forms. The Calcaire Grossier is represented in the English Tertiary by the Bracklesham beds; in the United States the Claiborne beds are equivalent to a portion of it.

CALCAR, käl'kär, Hans von. See Kalkar, Johann Stephan von.

CALCA'REOUS ROCK (Lat. *calcarius*, pertaining to lime, from *calx*, limestone, lime). Rock containing much lime, especially that in which the lime occurs in the form of carbonate ($CaCO_3$). Calcareous rocks may be chemically formed, as in the case of tufa, where lime carbonate in solution is precipitated through evaporation or other causes. They are generally aqueous rocks, and have been deposited in bodies of either marine or fresh water; the calcareous content has been supplied by the fossilized remains of the hard parts of animals that inhabited these waters. Thus many Paleozoic limestones are composed of shells, corals, and crinoidal fragments, while others, like chalk, consist of foraminifera and fragments of other minute organisms. A crystalline structure varying in degree from that of partially crystallized limestones to the granular statuary marble, is produced in calcareous rocks by metamorphic action. Oölite is a calcareous rock composed of small, concretionary, egg-like grains, resembling the roe of fish. The existence of the carbonate in rocks can be readily detected by the application of dilute nitric or muriatic acid, which causes effervescence through the liberation of carbonic acid. Quicklime is obtained from calcareous rocks by calcining them, i.e. by driving off the carbonic acid and other volatile matter by heat. Calcareous soils, often of great fertility, are produced from the disintegration of calcareous rocks. See Rock; Oölite; Soil; Limestone; Calcareous Tufa.

CALCAREOUS TU'FA (It. *tufa*, from Lat. *tofus*, tufa, tuff), Calc-sinter, Travertine, Stalactite, Onyx Marbles. Forms of carbonate of lime deposited from solution in springs, in limestone caverns, or by the evaporation of water in lakes, in the form of calcite or aragonite. When free from impurity they are white or translucent, but commonly they are stained with other substances, taking on yellow, gray, brown, or other colors. They have a spongy or cellular or concretionary structure, are banded, and often show rings of growth. A great variety of forms is exhibited, massive, tubular, botryoidal, stalactitic, or the forms of vegetable and animal remains which they sometimes incrust. Calcareous tufa has often been quarried and used for building purposes; the stone is quite soft when newly quarried and acquires hardness and solidity through exposure to the atmosphere. The temples of Pæstum, Italy, built several centuries before the commencement of our era, were constructed of such massive calcareous tufa. See Calcareous Rock; Limestone; Rock.

CALCASIEU, käl'kȧ-shū. A river of southwest Louisiana, its headstream, Cypress Branch, rising in the parish of Natchitoches (Map: Louisiana, B 3). It pursues a course at first southeast, then southwest, and empties into Lake Calcasieu (nearly 20 miles long and 3 to 6 miles wide), which is connected with the Gulf of Mexico by the narrow Calcasieu Pass. By means of numerous branches, chiefly from the west, it drains a large area in southwest Louisiana, and is navigable for small boats for about 130 miles.

CAL'CEOLA'RIA (Neo-Lat., from Lat. *calceolus*, a little shoe, referring to the part of the corolla resembling a slipper). A genus of plants of the order Scrophulariaceæ. There are numerous species, natives of South America, chiefly of that part of the Andes which is more than 9000 feet above the sea, a few of them reaching almost to the upper limits of vegetation. Some are found in lower and warmer situations, and some in the southern extremity of the American continent, others occurring in New Zealand and Mexico. They are so abundant in some parts of Chile and Peru as to give a peculiar aspect to the landscape. The calyx in this genus is four-partite; the corolla, two-lipped, the lower lip remarkably inflated, so as to form a bag; and the shape of the whole in some species considerably resembling that of a slipper. Some of the species are shrubby, some herbaceous, almost all the herbaceous species being perennial. Many of them have corymbs of numerous showy flowers. Yellow is the color which chiefly prevails in the flowers, and next to it purple; but the art of the gardener has succeeded in producing varieties and hybrids which exhibit many other rich and delicate tints. Calceolarias have been prominent in floriculture since about 1830, the curious appearance of the flowers combining with their beauty to render them attractive, and in no genus is the production of hybrids more easily or frequently effected. They are easily propagated by cuttings. Few plants require more liberal supplies of water. They are generally treated in the United States as half hardy or as greenhouse plants, and only the herbaceous forms are well known. Some of the species are used in South America for dyeing. The roots of *Calceolaria arachnoidea*, which is claimed to be one of the parents of many of the hybrids, are largely employed in Chile, under the name of *relbum*, for dyeing woolen cloths crimson. For illustration, see Greenhouse Plants.

CALCHAQUI, kȧl-chä'kē. A tribe formerly living on the western border of the Chaco, about the present Tucuman, Argentina. Great walls of cut stone found in their ancient territory, and stone-built tombs in which are found mummies and deposits of gold and copper ornaments, attest a considerable degree of civilization, which may have been due to the Incas, who conquered the Calchaqui about the year 1450. Interesting details of their customs and home life are given by the earliest missionaries. They have been long extinct, unless, as Tschudi surmises, a refugee remnant still survives on the northern coast of Chile. Even their linguistic affiliation is a matter of conjecture.

CALCHAS, kăl'kăs (Gk. Κάλχας, *Kalchas*). The prophet of the Greek army before Troy, gifted by Apollo with knowledge of the past and future. Through his counsel Achilles, Neoptolemus, and Philoctetes were brought to the army. At Aulis he advised the sacrifice of Iphigenia (q.v.) to appease Artemis, and foretold the length of the war. The common tradition made him go from Troy to Colophon, where, at the oracle of Apollo at Clarus, he met the prophet Mopsus, who defeated him in a contest of prophecy, whereupon he died of grief. His grave was shown in Italy.

CALCIF'EROUS (Lat. *calx*, lime + *ferre*, to bear). The term given to a subdivision of the Ordovician system. It is usually a sandy magnesian limestone, known as the calciferous sand rock. It is found in Canada and New York, extending southward through New Jersey and Pennsylvania. Its equivalent is also to be seen in the magnesian limestones of Iowa, Missouri, and Michigan. The formation is now known as the Beekmantown beds, from the locality near the village of that name in New York State. See ORDOVICIAN.

CALCIMINE (Lat. *calx*, limestone). A composition of zinc-white and glue sizing mixed with water, and applied as a finish to the plastered ceilings and side-walls of rooms. By adding coloring matter, any color desired may be produced.

CALCINATION, or **CALCINING** (Fr., Med. Lat. *calcinatio*, from Lat. *calx*, lime). The process of heating or roasting in furnaces, kilns, or heaps the various metallic ores, limestones, cement-mixtures, etc. It is resorted to as the first stage in the extraction of the majority of the common metals from their ores, is an essential process in lime and cement manufacture, and is a process of oxidation. See IRON AND STEEL; CEMENT.

CALCITE (Lat. *calx*, lime), CALCAREOUS SPAR, or CALC-SPAR. An anhydrous calcium carbonate that crystallizes in the hexagonal system, and differs from the mineral aragonite only in its form of crystallization. The massive and crystalline varieties are known as *limestone*, *marble*, and *chalk* (qq.v.), and are found almost universally, and in all geological formations. It is generally white or colorless, although pale shades of gray, red, green, blue, violet, and yellow are known, and, owing to the presence of impurities, even black and brown varieties are found. The crystallized varieties include the *dog-tooth spar*, the acute scalenohedral, crystals of which suggest its name; similarly, the name of *nail-head spar* has been suggested by the form of its truncated crystals; *satin spar* is a fine fibrous variety with a silky lustre. *Iceland spar*, originally found in basalt rocks in Iceland, is a fine, colorless, translucent variety, with the property of double refraction; the finest specimens of this variety are used for making polarizing prisms. Calcite is found chiefly in the following localities: Andreasberg in the Harz Mountains, Alston Moor and Egremont, Cumberland, and Matlock, Derbyshire, England, and Rossie, N. Y., the copper-mines at Lake Superior, and Warsaw, Ill., in the United States.

CAL'CIUM (Neo-Lat., from Lat. *calx*, lime). A metallic element isolated by Sir Humphry Davy in 1808. The name is derived from the Latin *calx*, lime, showing that calcium is the metal contained in lime. Calcium is not found native, but occurs extensively in combination with other elements in the forms of calcite (including limestone, marble, and chalk), aragonite, dolomite, selenite, gypsum, etc. It is also found in river and spring waters and in the bodies of plants and animals. Spectrum analysis has revealed its presence in the sun. Davy obtained metallic calcium by the electrolysis of calcium chloride in the presence of mercury, the metal remaining as a powder on heating the amalgam thus produced. Calcium (symbol, Ca; atomic weight, 40.07) is a lustrous, clear, yellowish-white, very ductile, and malleable metal of specific gravity 1.57. It melts at a red heat. The metal itself has no commercial application, although it is capable of forming a crystalline alloy with zinc. It is readily oxidized in the air, even at ordinary temperatures, and when heated to redness it burns with a very bright yellow flame. Like sodium and potassium, it decomposes water with evolution of hydrogen. With the non-metallic elements it is capable of forming compounds which are generally colorless and have an acrid taste. The more important of these compounds are described under their special names.

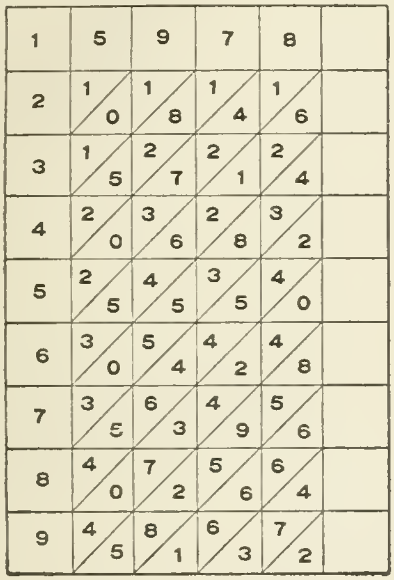
CALCIUM CARBIDE, CaC_2. A compound of calcium and carbon. It was originally discovered in 1836 by Edmund Davy, who produced it simply as a laboratory curiosity. In 1862 Wöhler prepared it in Göttingen, and about the same time Berthelot, in Paris, obtained it, but only in small quantities. In 1892 Thomas L. Willson, in Spray, N. C., found that by heating a mixture of lime and carbon in an electrical furnace, calcium carbide and carbon monoxide were formed. Almost simultaneously Henri Moissan, in Paris, announced his discovery of a similar method for its production. Its property of decomposing water with the formation of acetylene gas had already long been known, and the foregoing method just described made possible the economical production of acetylene gas for illuminating purposes, and accordingly that industry has since been largely developed, especially in the United States. The calcium carbide, or carbide, as it is called commercially, is now largely manufactured at Niagara Falls, N. Y., and Sault Ste. Marie, Mich.; and also at various places in Europe. The process consists essentially in submitting a mixture of powdered lime and coke-dust to the action of carbon electrodes in a furnace at a temperature of about 3300° C. The fused material is allowed to cool and harden, after which it is removed. Calcium carbide is a hard, brownish crystalline compound with a metallic lustre and a specific gravity of 2.22, that is non-inflammable, infusible, and insoluble in most acids and all alkalies; is absolutely unaffected by jars, concussions, or time, and is an inert and stable substance, except when brought into contact with water. Its principal use is for the manufacture of acetylene. Since its commercial introduction into the United States, its manufacture has passed into the control of a single corporation, who report that over 7000 tons of carbide were consumed in the year ending June 1, 1899. Its history and methods of production have been largely described in the various technical journals, and the *Acetylene Gas Journal*, published in Buffalo, N. Y., is devoted to the exploitation of the new illuminant. Consult, also, Thompson, *Acetylene Gas: Its Nature, Properties, and Uses*; also *Calcium Carbide: Its Composition, Properties, and Method of Manufacture* (London, 1899). See ACETYLENE.

CALCIUM LIGHT. See DRUMMOND LIGHT.

CAL'CRAFT, JOHN WILLIAM. The *nom de plume* of John William Cole. See BRIDE OF LAMMERMOOR, THE.

CALCULATING MACHINES (from Lat. *calculare*, to reckon, compute; see CALCULUS). Mechanical contrivances designed to facilitate computations, to relieve the calculator from the mental strain of his work, and to insure greater accuracy in results. Calculating machines exist in various forms, and are now made in such perfection that large business houses and banks regard them as a necessity, while many scientific computations would have been abandoned but for their help. An instrument which is used for the purpose of illustration or instruction in number work is called a reckoning apparatus, but one which automatically produces the results of number combinations involving the union of different orders is called a calculating machine.

The earliest known instrument of calculation of any importance is the *abacus*. The Chinese lay claim to its invention. Its use by the Egyptians as early as B.C. 460 is definitely asserted by Herodotus. It was probably used by the Babylonians, and certainly by the Greeks and Romans, from whom it spread to all Europe. It has existed in various forms—the knotted strings, the sand-board, the pebble-tray, the counters, and the frame of beads. The last form is still in use, known as the Chinese *swan-pan*, the Russian *Stchoty*, or the Japanese *Soro-Ban*. The ordinary swan-pan consists of a frame divided into two sections, holding several parallel rods, each containing several movable beads.



1	5	9	7	8	
2	1/0	1/8	1/4	1/6	
3	1/5	2/7	2/1	2/4	
4	2/0	3/6	2/8	3/2	
5	2/5	4/5	3/5	4/0	
6	3/0	5/4	4/2	4/8	
7	3/5	6/3	4/9	5/6	
8	4/0	7/2	5/6	6/4	
9	4/5	8/1	6/3	7/2	

ARRANGEMENT OF NAPIER'S RODS.

In the Chinese swan-pan, each bead on the bottom row in the right division represents one unit, and each on the bottom row in the left division represents five units. In the next higher row the value of each bead is ten times as great, and so on.

The first improvement over the ancient abacus consisted in the use of counters, on a plan attributed, probably erroneously, to Boethius. Later these counters bore numbers, and were attached to rods, disks, or cylinders, which could be moved so as to indicate the desired results. A notable example of this type is the set of rods invented by Napier and known as virgulæ; or, popularly, as Napier's rods or bones. These consist of flat pieces of bone or ivory, divided into squares, which (on ten of the rods) are subdivided by diagonals into triangles, except the squares at the upper ends of the rods, which spaces are numbered from 1 to 9.

To illustrate the process of multiplication, consider the product of 5978 by 937. Arrange the proper rods, as in the figure, so that the numbers at the top indicate the multiplicand, and on the left place the rod headed 1. In this rod find the right-hand figure of the multiplier, which in this case is 7. Passing across this horizontal row, add obliquely the two rows of corresponding digits, writing the results in each case as the digits of the first partial product. For example, the first figure on the right is 6; this is written in the units place in the first partial product. Next add the 5 and 9 in the adjoining oblique row, which gives 4 in the tens place, with 1 to carry. This makes 8 in the hundreds column. Proceed in the same way with the other figures of the multiplier, and add the partial products as in ordinary multiplication.

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   17934
  53802
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The chief point of improvement over the primitive abacus consists in supplying the instrument with moving scales, which enable the calculator to form number combinations without actually counting together the different addends. Kummer (1847) accomplished this by running parallel rods in grooves; Lagrous (1828) by concentric rings; Djakoff and Webb by bands on rollers.

Another form of the calculating machine is the *slide rule*, which is more generally employed than any other class of calculating instruments, particularly by engineers and statisticians. In its simplest form it consists of two rules, arranged to slide on each other, and so divided into scales that by sliding the rules backward or forward until a selected number on one scale is made to coincide with a selected number on the other, the desired result is read off directly on a third scale. By means of a duplex slide rule, where the rule may be set for four factors instead of two, more complicated problems may be solved. *Revolving slide rules* are employed to increase the virtual length of the scales and the number of decimal places to which results may be read. In the Thacher calculating instrument, a cylinder 4 inches in diameter and 18 inches long revolves within a framework of triangular bars, each of which contains a scale on two sides. The scales contain 33,000 divisions and 17,000 engraved figures, executed on a dividing machine made expressly for the purpose. *Fuller's spiral slide rule* consists of a wooden cylinder containing a spiral scale 42 feet long. *Circular slide rules*, resembling watches, are also made. The slide-rule principle is also employed in instruments used to work out specific problems, such as the flow of water in pipes, or the strength of beams. Such *computers* may be either like the ordinary slide rule, with scales in terms of the factors involved, or, as in the various Cox computers, there may be a foundation plate, revolving disk, revolving segment, and index or pointer, with proper scales. The various slide rules proper all depend on the mechanical use of logarithms, and the scales are graduated on a logarithmic basis. By referring to the article LOGARITHMS, the operation of a simple slide rule will readily be understood, as the various graduations correspond to the logarithmic functions, and the appropriate length of each is determined from a table of logarithms. The figures inscribed on the scales, however, are those of the numbers corresponding to the logarithms. For example, to multiply 2 by 2, the number 2 on the scale is brought opposite the number 2 on the second scale, and, as a result, the zero of the latter is distant from the zero of the first by an amount equivalent to the sum of the two logarithmic graduations. The number corresponding to the point at which the zero or indicator stands is, of course, the product, which in this case is 4. The complexity of the problems which may be solved with the aid of the slide rule varies with the different rules; but, in general, it may be said that all problems involving multiplication and division may be solved by any of them, including powers, roots, and proportions, simply by setting the rule and reading off the indicated result. By providing scales with trigonometrical instead of arithmetical functions, the uses of the slide rule may be increased greatly, and often the two classes are engraved on reverse sides of the smaller slide rules. The rule is particularly valuable where the same operation is to be repeated many times, as in computing percentages, or where many long and wearisome calculations are to be made.

The improved calculating instruments of Slonimsky (1844) and Lucas (1885) effect multiplication without the supplementary addition required by Napier's rods. Quotients and remainders, in the case of division, are likewise fully determined by Genaille's instrument. Instruments in which mechanisms are combined for both addition and multiplication are sometimes called *arithmographs.* Rous (1869) constructed an apparatus of this kind, combining a set of Napier's rods with the abacus. More perfect forms are those of Th. von Esersky (1872), Troncet (1891), and Bollée (1895). These form the border line between the elementary reckoning apparatus and the more elaborate calculating machine. As numbers are essential to reckoning, so number mechanism is the basis of calculating machinery. This mechanism is arranged for the decimal system, and combines elements for the various powers of 10. The elements are usually cylindrical disks, on whose plane or curved surfaces are placed the figures 0, 1, 2, . . . 9, once or several times. Whatever the arrangement of these number disks, their axes of rotation may be parallel and lie in a plane, or may form the elements of a cylindrical surface, or may coincide so that the numbers are beside one another on a common cylinder. This last arrangement, which seems to have appeared for the first time in the machine of Périere (1750), is preferred, because it requires the least space and brings the figures into close proximity. In every calculating machine the mechanism automatically carries over from any order to the next higher. Whenever a number disk is rotated so that it points to the figure 9, any further movement also moves the disk of the next order: that is, for every ten-place rotation of any desired number disk, the next disk rotates one place. For addition, it is only necessary that each element of the number mechanism admit of being moved forward independently one or more figures. For subtraction, the older machines generally contain rows of red figures arranged in reverse order, so that the motion of the disk may still take place in the same sense. It is immaterial whether this motion be produced directly by the hand or indirectly by a lever; but it makes a difference in the rapidity of the work whether different figures of the same rank are added by the movement of one and the same element, or by the motion of different elements. To the first group belongs the oldest of all calculating machines, the *machine arithmétique* of Pascal (1642), designed for adding and subtracting. The modern machines of Roth (1843) and Webb (1868), and Orlin's *automatische Schraubenrechenmaschine* (1893), are modifications of the *machine arithmétique.* The necessary speed and accuracy of movement have been gained by the introduction of keys, as in the machines of Stettner (1882) and Mayer (1887). A key being provided for the numbers from 1 to 9, in the various orders, one has to fix the eye upon the numbers of one figure only. The latest improvement is a contrivance for automatically printing both the addends and their sum, thus leaving little to be desired in the form of an addition instrument. This is a feature of Burrough's registering accountant (1888) and Carney's cash register. Goldman's 'arithmachine' (1898) is one of the latest of the simple and practical machines.

In order mechanically to effect repeated addition—that is, multiplication—a rack or special carrying apparatus is necessary. This device makes it possible by a single motion of the hand, as the rotation of a crank, to carry simultaneously the set of number disks over a desired number of places. Four methods have been devised for this, but the most common is the *stepped reckoner* of Leibnitz, a cylinder with nine teeth of different lengths, corresponding to units, tens, etc. Another means also known to Leibnitz, and lately coming into favor, is the use of toothed wheels, whose teeth may be shoved in at will, thus rendering the wheels inoperative. Among the instruments of this type, with slight modifications, are the arithmometer of Thomas (1820), the machine of Maurel and Jayet (1849), and the arithmometers of Odhner (1878) and Küttner (1894). The *machine à calculer* of Bollée (1888), designed especially for multiplication, operates on a new principle. The products of numbers from 1 to 9 are represented by pairs of pegs, whose lengths correspond to the units and tens of the products. The pegs limit the freedom of the rack, which can be so moved that the product of the multiplicand by each figure of the multiplier is carried over to the addition machinery. In the calculating machine of Steiger (1892) partial products are expressed by pairs of disks, and in Selling's *elektrische Rechenmaschine* (1894) by electro-magnets. These machines are defective in that the multiplication must be performed step by step, using a multiplier of one figure only. They are made to perform division by moving a lever, which reverses the motion of the number disks. Much care has also been given to perfecting instruments having for their object the computing of mathematical and astronomical tables and the tabulation of functions. These are, in fact, the only means of producing thoroughly accurate tables. The idea practically originated with Müller (1786), but Babbage (1823) was the first to obtain valuable results with a machine of this kind. The machines of Wiberg (1863) and Grant (1871) are improved forms of this type. Babbage (1834) also invented an 'analytic engine,' designed to perform various analytic and arithmetical operations, but it was never completed.

The following machines of recent mention are extensively used: the first three are of German make and the last three American, the latter being the more practical: Beher's addition machine (1892), of keyboard type, limited to sums under 500; Illgen's calculator (1888), limited to sums under 1000; Runge's addition machine, Berlin (1896), adding numbers of several figures; Felt's comptometer, Chicago (1887), keyboard type, performing all four operations; Burrough's registering accountant, Saint Louis (1888), an addition machine of 81 keys, with a capacity of 2000 entries per hour, and automatically printing both the addenda and the total sum; Carney's cash register, Dayton (1890), an adding and printing machine of great perfection.

Cash-Registers are a form of calculating machine in general use in retail stores, whose chief functions are to make a record of money received from sales of merchandise in a retail store, as the money is placed in the cash-drawer, and to add automatically this sum to the total previously placed in the drawer; it also indicates to the customers the record which has been made. The more complex cash-registers have been further developed so that it is possible to include an automatic record of other transactions which take place in a retail store, including credit sales and the separate sales of individual clerks or of particular lines of goods, so that they may be referred to at the close of the day's business.

The first practical cash-register was invented by James Ritty, of Dayton, Ohio, who secured his patent in 1879. In this first register the record was made on adding wheels and displayed by hands on a dial, but in later inventions the record is sometimes made by puncturing printed rolls of paper and is shown by indicators which rise and fall as the mechanism is operated, a number equal to the amount of the purchase rising as the cash paid is deposited in the drawer, the same operation causing the number which records the previous purchase to fall. In the 'detail adders,' manufactured by the National Cash Register Company, the mechanism is operated by pressing the proper registering key. A single pressure of the finger unlocks and throws open the cash-drawer, rings a bell, drops the indicator showing the last transaction, raises an indicator showing the amount of the new transaction, and at the same time records it on the adding wheels inside the register. Each registering key is connected with a corresponding adding wheel inside the register, which shows the total amount of registrations made on that key. For example, if the '5-cent' key be pressed five times its corresponding adding wheel shows a total of 25 cents. Thus the total amount of the day's sales can be ascertained at any time by adding together the total amounts shown by the adding wheels. These registers can be arranged to keep separate record of 'charge,' 'received on account,' and 'paid out' transactions, or to show separately the receipts from different classes of goods. A drawer cannot be opened without making both an indication to the customer and an inside record under lock and key.

Electric Tabulating Machines, such as the one devised by Hollerith for recording and summarizing the United States census returns, may be classed under calculating machines. This apparatus is in three parts. The first operation is to punch holes in a card, corresponding to the facts to be recorded for each individual, the punches being operated from a keyboard of 240 characters. After the cards are punched they are fed into a machine, which, by means of the holes and certain electric devices, adds one to the total record for the fact indicated by each hole, such as sex, color, or age. Next the cards are placed in sorting boxes, in order to secure a combination of facts, such as the number of black persons who are married, and by means of electric connections which are acted upon only by cards having holes corresponding to the facts to be tabulated, the record is made.

For descriptions of calculating machines, consult: Mehmke, "Numerisches Rechnen," in *Encyklopädie der mathematischen Wissenschaften*, Vol. I. (Leipzig, 1901), containing numerous figures; Unger, "*Einige Additionsmaschinen*," *Abhandlungen zur Geschichte der Mathematik*, Vol. IX. (Leipzig, 1899); Shaw, "Theory of Continuous Calculating Machines," in *Phil. Transactions of Royal Society*, Vol. CLXXVI. (London, 1885).

CALCULATORS (Lat. *calculator*, computer; see Calculus), Remarkable. Arithmetical prodigies, often spoken of as 'lightning calculators,' having an unusual capacity for combining numbers. The wonderful feats of these prodigies have been pronounced genuine by competent judges, although their psychological peculiarities have not been fully explained. Two peculiarities, however, seem characteristic of most of the known cases: an extraordinary memory for numerical combinations, and unusual methods of grouping numbers. That their ability is not entirely the result of special training is attested by the early age at which the power is manifested. Thus, at the age of 6, T. H. Safford computed mentally the number (617,760) of barleycorns in 1040 rods, and could extract the cube roots of numbers of 9 and 10 figures. Buxton solved the problem, to find the product of doubling a farthing 139 times, the result, expressed in pounds, being a number of 39 figures. Zerah Colburn, at 9 years of age, gave at sight the factors of 294,967,297, and in 20 seconds found mentally the number of hours in 1811 years. Raising 991 to the fifth power in 13 operations, and giving the product of any pair of two-figure numbers in 1½ seconds, are feats accomplished by Arthur Griffith, who also memorized the squares of all numbers up to 130 and the cubes up to 100. Other noted prodigies are Annich, Bidder, Vinckler, Pughiesi, Mondeux, Magimelle, and Inaudi.

CALCULUS (Lat., a small stone, or pebble, which was used in reckoning, or calculations, by the Romans). A term applied in mathematics to any method of treating problems by means of a system of algebraic notation. Thus, the Calculus of Forms (see FORMS) is a symbolic treatment of the properties of invariants; Imaginary Calculus is the method of calculating by the use of the imaginary unit (see COMPLEX NUMBER), and the Calculus of Quaternions (see QUATERNIONS) is the method of treating certain problems with the aid of the quaternion symbolism. Usually, however, the term is employed to designate the Differential and Integral Calculus, a branch of mathematical science affording, by one general method, a solution for many of the most difficult problems of pure and applied mathematics.

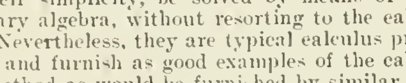
THE DIFFERENTIAL AND INTEGRAL CALCULUS. This is one of the most useful branches of mathematics. While elementary algebra and geometry deal with quantities whose value is fixed, the calculus investigates quantities whose value is continually changing. Considering that all nature in all its aspects varies continually, the importance of a mathematical method of dealing with variables is evident; and it is easy to see why science had made so little progress before the invention of the calculus, and why progress has been so rapid since.

Three simple examples may serve to show the kind of problems usually attacked by the calculus, and the manner in which it solves them. The first two of these examples can also, on account of their simplicity, be solved by means of elementary algebra, without resorting to the calculus. Nevertheless, they are typical calculus problems, and furnish as good examples of the calculus method as would be furnished by similar but much more complicated problems lying really beyond the power of elementary mathematics.

Problem I. Suppose the sum of two adjoining sides of a rectangle known. What must be the length of each side so that the rectangle may have the greatest possible area?

Problem II. A person in a boat 3 miles from the nearest point on a straight shore wishes to reach a place 5 miles away from that point. He can row 4 miles an hour and walk 5 miles an hour. Where should he land in order to reach his point in minimum time?

Problem III. To determine the work performed when a gas is compressed at constant temperature is one of the fundamental problems of theoretical engineering. Work is generally defined as the force required to move a body, multiplied by the distance traversed. In the case of a gas compressed in a cylindrical vessel, the body moved is the piston. If at the beginning of the experiment the pressure exercised on the piston is, say, p pounds per square inch of surface, and the area of the piston is a; then $p \times a$ is evidently the force acting on the piston. This force, however, multiplied by the distance traversed by the piston during compression will not by any means give the work performed. For during compression the force will, of course, have to be continually increased; in other words, it will not retain its original value ap fixed, but will be a variable. In this case algebra and geometry fail to give a method of direct computation and the calculus has to be resorted to.



In order to understand how the calculus deals with problems of this nature, it is necessary to grasp clearly some fundamental ideas, which usually appear somewhat difficult to the beginner in calculus, just as the idea of any fixed number being represented by the letters a, b, c, appears difficult to the child first taking up the study of elementary algebra.

Fundamental Ideas: Function, Differential, Differential Coefficient, Limit.—Variables are represented in calculus by the Latin letters x, y, etc., or by the Greek letters ξ, ζ, etc., just as unknown quantities are represented in algebra. If the value of one variable continually depends on that of another variable, the first variable is said to be a *function* of the second, and the fact is denoted by writing: $y = f(x)$. Thus, the variable area y of a square is said to be a function of the variable length x of its side, and in this case the expression $y = f(x)$ stands for the equation $y = x^2$. In investigating the functions and their variables, the calculus catches them at a given moment for the purpose of determining the relative rate of their variation at that moment. Consider the motion of a ball thrown up in the air. Its velocity changes from instant to instant. We might get a rough idea of its motion by measuring the distance traversed during the first second, during the second second, during the third second, etc. But our results would be far from precise; for, however small an interval of time a second is, the velocity of our ball, changing continually, must be different at the end of that interval from what it is at its beginning. Our results would be even rougher if instead of the second we employed as a unit of time the minute. To render the results mathematically precise, we would have to take for our unit not a finite, but an infinitely small interval of time, an instant. The distance traversed during such an interval would be called the *differential* of distance and would be denoted in calculus by the symbol dl, if l stand for distance. Similarly, our infinitely small interval of time would be called the *differential* of time and would be denoted by the symbol dt, if t stand for time. But as this idea of what a differential is is somewhat vague, owing to the difficulty of actually conceiving something that is 'infinitely small,' the following considerations may be resorted to. Studying the motion of a ball thrown up in the air, we consider infinitely small intervals of time dt merely in order to be able to think of the motion as uniform; for within any finite interval the motion is variable. But if at a given instant the motion should actually become uniform, and continue so, we might think of our differential dt as representing any finite length of time, be it 5 minutes, or 10 minutes, or 500 minutes. For when a body moves with perfectly uniform speed, that speed may be readily determined by ascertaining the distance traversed during any interval of time whatever; the result is the same whether we divide the distance traversed in 5 minutes by 5, or that traversed in 10 minutes by 10. We may, accordingly, define the differential of distance dl as the distance that *would be* traversed by the ball in an arbitrary, finite interval of time, dt, beginning at a given instant, if at that instant the motion became uniform. In this manner we may avoid thinking of infinitely small quantities. The velocity would then be $dl \div dt$, no matter how great or small dt is supposed to be. The ratio $\frac{dl}{dt}$ is called the *differential coefficient* of l with respect to t—the distance l being of course 'a function' of the time t. This ratio represents a *limit*. For, considering again the ball thrown up in the air, the error introduced by choosing a finite instead of an infinitesimal interval of time is the less the smaller an interval is chosen, and finally the true velocity $\frac{dl}{dt}$ is approached as a limit, when the interval of time becomes infinitely small. All this is concisely represented by a few symbols, as follows:

$$\underset{\Delta t \doteq 0}{\text{limit}} \left(\frac{\Delta l}{\Delta t}\right) = \frac{dl}{dt}$$

In this expression Δt stands for some finite interval ('increment') of time, and Δl for the distance actually traversed during that interval. And the expression tells that when Δt approaches zero ($\Delta t = 0$), i.e. when it becomes infinitely small, the ratio $\frac{\Delta l}{\Delta t}$ approaches as a limit the value $\frac{dl}{dt}$. It need hardly be remarked that while dl and dt are themselves infinitesimal quantities, their ratio may have any finite value, large or small.

Maxima and Minima.—Since $\frac{dl}{dt}$ represents the velocity of the ball at any moment of the flight, it is evidently itself a variable quantity. For when, say, a rubber ball is thrown up in the air, the velocity of its motion becomes smaller and smaller until the highest point in its flight is reached; at that point the ball *pauses* for an instant and then begins to descend with increasing speed until it reaches the ground. Here it *pauses* again for an instant and then again goes up in the air. At the instant the ball is at the highest point, as well as at the instant it touches the ground, the velocity is therefore zero; i.e. $\frac{dl}{dt} = 0$. But as the two points reached by the ball are respectively the *highest* and the *lowest*, it may be said that when the function l has its maximum or minimum value, its differential coefficient with respect to its variable (i.e. $\frac{dl}{dt}$) is zero. This must be carefully remembered.

Bearing in mind the ideas explained in the preceding paragraphs, the problems cited at the beginning of the article may now be analyzed without any difficulty.

I. *Solution of the First Problem.*—In the problem of the maximum rectangle, let a be the known sum of two adjacent sides, let x be one of the sides, and let y be the area of the rectangle. Then

$$y = x\,(a - x),\ \text{or}\ y = ax - x^2.$$

Seizing the rectangle at some point in its variation, let us lengthen the side x by some finite amount, Δx, and suppose that this causes the area to increase by a finite amount, Δy. Our equation then becomes

$$y + \Delta y = a\,(x + \Delta x) - (x + \Delta x)^2 =$$
$$ax + a\Delta x - x^2 - 2x\Delta x - (\Delta x)^2.$$

Subtracting the original equation, $y = ax - x^2$, we get

$$\Delta y = a\,\Delta x - 2x\Delta x - (\Delta x)^2,$$

and, dividing throughout by Δx,

$$\frac{\Delta y}{\Delta x} = a - 2x - \Delta x.$$

Making Δx smaller and smaller without limit, it will ultimately approach zero. Then $a - 2x - \Delta x$ will become simply $a - 2x$, while the ratio $\frac{\Delta y}{\Delta x}$ will approach its limit $\frac{dy}{dx}$, and hence we will have

$$\frac{dy}{dx} = a - 2x.$$

Now, it was shown above that, at the instant a function passes through its maximum value, its differential coefficient is zero. Hence, when the area of our rectangle is the greatest possible, $\frac{dy}{dx} = 0$, and therefore, $a - 2x = 0$, or

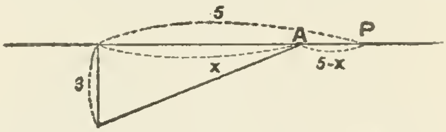
$$x = \tfrac{1}{2}a.$$

But this tells us that each side must be one-half of the known sum, i.e. that the two adjoining sides must be made equal in order that the rectangle may have its maximum area.

The process just employed in solving the problem may be described as 'differentiating with the aid of the theory of limits.' Indeed, we started with the law that the area of a rectangle equals the product of two adjoining sides, a law expressed in our case by the equation $y = x(a - x)$. We then ascertained the ratio of the finite increment of area to an actual finite increment of the variable side x. Next we ascertained the limiting value of that ratio corresponding to an infinitely small increase of the side. This gave the value of the differential coefficient $\frac{dy}{dx}$ of our function as $a - 2x$. And as it had been shown before that the differential coefficient is zero at the point where a function has its maximum value, we wrote $a - 2x = 0$, which gave the value of the side x for that point.

By analogous processes of reasoning we may 'differentiate' any function whatever, and thus determine the form of its differential coefficient. In practical work, however, it is not necessary to go through the whole process every time a function is differentiated, and the differential coefficient of a function is usually obtained directly by the use of a few general formulas, the demonstrations of which are given in all text-books of calculus. In solving our other problems we will make direct use of two such formulas.

II. *Solution of the Second Problem.*—In the problem of the person in a boat, call A the point where he must land in order to reach his point in the least time. An inspection of the accompanying figure shows that the distance of the boat from the point A is $\sqrt{3^2 + x^2}$ (hypothenuse of the right-angled triangle). To row this distance at the rate of 4 miles an hour requires $\frac{\sqrt{3^2 + x^2}}{4}$ hours, or, as it may be written, $\frac{(9 + x^2)^{\frac{1}{2}}}{4}$ hours. The distance of the landing point from the point of destination is denoted by $5 - x$. To walk this distance at the rate of 5 miles an hour requires $\frac{5 - x}{5}$ hours. The total time (call it



y) required to reach the point is therefore $y = \frac{(9 - x^2)^{\frac{1}{2}}}{4} + \frac{5 - x}{5}$ The question is, what must be the numerical value of x in order that this expression for time may have the smallest possible value? As in Example I., the question may be answered by ascertaining the form of the differential coefficient $\frac{dy}{dx}$ and making it equal zero, so that it may correspond to the minimum magnitude of y. The result is as follows:

$$\frac{dy}{dx} = \frac{x}{4\sqrt{9 + x^2}} - \frac{1}{5}$$

When y is a minimum, $\frac{dy}{dx} = 0$, and therefore,

$$\frac{x}{4\sqrt{9 + x^2}} - \frac{1}{5} = 0,$$

whence $x = 4$. To reach the point of destination in minimum time, the person must therefore land 1 mile $(5 - 4 = 1)$ from that point.

Differentiation and Integration.—It may be seen from the examples thus far discussed that the problem of the differential calculus is to obtain for every function considered the differential coefficient $\frac{dy}{dx}$; i.e. the rate of change of the function y with respect to its variable x. The process may also be described as follows: To differentiate a given magnitude, y, expressed in terms of its variable, x, is to obtain the value of the infinitesimal element dy in terms of the infinitesimal element dx of the variable x. The converse process, called integration, may be described as follows: To integrate means to obtain the function itself, when its rate of change with respect to the variable is given: i.e. to find y in terms of x when $\frac{dy}{dx}$ is given. The problem of the integral calculus may also be stated in the following terms: To integrate is to find the magnitude y in terms of the variable x, when dy (an infinitesimal element of y) is given in terms of dx (an infinitesimal element of x). In the latter definition integration appears as a process of *summation*, the addends being an infinite number of infinitely small elements. The symbol of integration is $\int$ (the mediæval S, standing for *summa*). Thus, the symbol $\int dx$ indicates that it is required to integrate the differential of x.

The Constant of Integration.—Since a fixed (constant) quantity neither increases nor decreases, its *differential* is nothing at all. If, therefore, c denote any constant whatever, we may write $dc = 0$. For this reason the differential of $x + c$ is simply dx, the same as the differential of x. Comparing $x + c$ and x, we see that x is one of an infinite number of possible values of $x + c$; the latter, namely, equals x in the particular case where $c = 0$. When it is required to find *in general* the integral of dx, we therefore write not x, but $x + c$. So that $\int dx = x + c$. The constant c is then called the 'constant of integration,' and may either have a finite fixed value, or else may equal zero.

III. *Solution of the Third Problem.*—The last of the cited problems may now be attacked, viz. to determine the work performed when a gas is compressed at constant temperature. The difficulty of this problem is in the fact that during compression the force is variable, i.e. it must be continually increased. If we were to suppose the force constant, we would, in calculating the work, commit the greater an error, the greater the amount of compression. But suppose the piston to be moved inward only an infinitely small distance. If we then calculate the work required, on the hypothesis that within that distance the pressure remains constant, we commit only an infinitely small error. In other words, our result is infinitely near the truth. Let dl therefore stand for an infinitely small distance traversed by the piston, let the area of the piston be a, and let the variable pressure be denoted by p. The work is then $padl$. But as adl is the *volume* of the infinitely small cylinder traversed by the piston, it may be denoted by dv and regarded as an infinitesimal element of our cylindrical vessel. The work is thus pdv.

To determine now the finite amount of work required to compress the gas from some initial volume, v_1, to some final volume, v_2, we will first answer the question: How much work would be required in compressing a given amount of gas from any volume v to unit volume? This is accomplished by 'integrating' pdv, i.e. by performing the operation denoted by the symbol $\int pdv$; and our result will be infinitely near the truth, because the error involved in assuming that the pressure p remains constant through the infinitesimal compression dv is infinitely small.

To integrate pdv we must remember that at constant temperature the product of pressure and volume of a gas is constant: $pv = k$, whence $p = \frac{k}{v}$. Substituting this in $\int pdv$, we have $\int \frac{kdv}{v}$. Now $\frac{kdv}{v}$ might be shown, by the method of limit, repeatedly employed in this article, to be the exact differential of either $k\log v$, or $k\log v + c$, c being any constant. We may therefore write, conversely,

$$\int \frac{kdv}{v} = k\log v + c,$$

the constant of integration c being retained so as to give the solution its more general form.

The integral calculus has thus performed for us a wonderful task. Figuratively speaking, it employed a cylinder of volume v filled with gas and compressed it, an infinitesimal amount at a time, until unit volume was attained; it then summed up the infinitesimal amounts of work performed, and it has told us that the total amount of work done is $k\log v + c$. The result is algebraic, since v may have any finite value whatever. But to obtain a desired particular result, all we have to do is to substitute for v some numerical value. Further, the work performed in compressing the gas from some particular volume v_1 to some particular volume v_2 evidently equals the *difference* between the work required to reduce the gas from volume v_1 to unit volume, and that required to reduce the gas from volume v_2 to unit volume. The required work, W, between the limits v_1 and v_2 is, therefore,

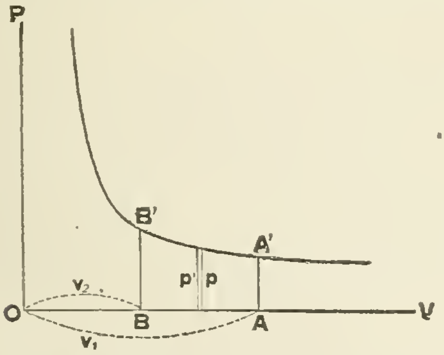
$$W = k\log v_1 + c - k\log v_2 - c.$$

The limits being defined, this 'integral' is called a *Definite Integral*, and the operation is usually denoted as follows:

$$\int_{v_2}^{v_1} \frac{kdv}{v} = k\log v_1 - k\log v_2 = k\log\frac{v_1}{v_2}$$

The constant k, coming from the law $pv = k$, depends on the amount of gas employed and on the temperature at which the compression is carried out. It may, of course, be found by actually measuring the pressure and volume of the given amount of gas at the given temperature, and multiplying the pressure by the volume. By substituting in the above expression this value of k, as well as the numerical values of the initial volume v_1 and the final volume v_2, involved in an actual compression, we will finally obtain the work which the problem required to calculate, and this is actually the way in which engineers determine that important quantity.

Another Way of Stating and Solving the Third Problem.—The relation $pv = k$ between the pressures and volumes of a gas whose temperature is kept constant (i.e. the law of Boyle and Mariotte) may be represented geometrically by a curve called an equilateral hyperbola, every point of the curve corresponding to a definite pressure and volume. (See ASYMPTOTE.) Further, it is shown in text-books of natural philosophy that the work performed in compressing the gas from an initial volume represented by the line OA (see figure) to a final volume, OB, is represented by the area AA'B'B. The problem of determining the work may therefore be viewed as requiring to determine the area inclosed by the hyperbola and the axis OV between the limits $OA = v_1$ and $OB = v_2$. To solve this problem the area AA'B'B may be imagined as made up of an infinite number of infinitely narrow strips. One such strip is roughly shown in the figure between the lines marked p and p'. The difference between p and p' would evidently be the greater, the greater the distance between them. But since the distance is supposed to be infinitely small, the two lines may be taken as equal and the strip may be considered as a rectangle. Calling its infinitely small base dv, the area of the rectangle is seen to be pdv. The total area AA'B'B may now be obtained by summing up the infinite number of 'differentials of area' like pdv inclosed between the limits $OA = v_1$ and $OB = v_2$. The summation may be performed by the integral calculus and is denoted by a definite integral, as follows: $AA'B'B = \int_{v_2}^{v_1} pdv.$



We have seen before that the result of this integration is $k\log\frac{v_1}{v_2}$. The required area therefore equals the natural logarithm of the ratio $\frac{\overline{OA}}{\overline{OB}}$, multiplied by the number (k) representing the product of any pair of coördinates, such as $\overline{OB} \times \overline{BB'}$, or $\overline{OA} \times \overline{AA'}$, etc. The calculus method is analogously employed whenever it is required to find the area inclosed by a given curve, elementary geometry being in most cases powerless to furnish the desired answer; and thus the calculus finds extensive application in the solution of many important problems of geometry.

The above sketch outlines the methods of reasoning by which the calculus attacks problems involving variable quantities. As to its limitations, it must be observed that while the differential calculus teaches how to differentiate readily any function whatever, the converse problem, viz. that of integrating a given differential, is often very difficult, requiring all manner of algebraic artifices, and is sometimes altogether impossible. In other words, in their studies of nature, scientists are often led to construct differentials (just as in our third problem we constructed the differential pdv) which they cannot integrate, because they can conceive no function which, on differentiation, would yield the given differential. Finally, it may be observed that the flour is no better than the grain, and if data that are made to pass through the mill of the calculus lead to doubtful results, it is the fault not of the calculus, but of the data: the calculus itself is as exact as any other branch of mathematics, in spite of the fact that the things it deals with seem so often to dwindle away into nothing.

HISTORY. The invention of the calculus method is generally referred to the latter half of the Seventeenth Century, but the course of its early development really leads much further back. Thus, the 'method of exhaustion,' which, as first applied, consisted in comparing the area bounded by a given curve with the area of an inscribed or circumscribed polygon whose number of sides is continually increased, is related to the present calculus through the doctrine of limits. Similarly, the surfaces of the sphere, cylinder, and cone were compared with prismatic and pyramidal surfaces. By this method Archimedes calculated the value of π, obtained the areas of the parabola, ellipse, and one of the spirals, and found the ratio of a spherical surface to the surface of the circumscribed cylinder. Kepler (1615) was the first to improve this method by introducing into geometry the idea of infinity. He considered the circle as composed of an infinite number of triangles (with their vertices at the centre and with their bases on the circumference), and the cone as composed of an infinite number of pyramids. The next advance is due to Cavalieri (q.v.), who effected quadrature by summing the infinitesimal elements into which he divided his areas, and established the properties of the centre of gravity relating to solids of revolution. So far the end sought by mathematicians was the solution of particular problems, as the rectification and quadrature of certain curves. Thus, also, Wallis extended the application of Cavalieri's method of indivisibles, Descartes (1637) increased its power by the introduction of coördinate geometry (see ANALYTIC GEOMETRY), and Fermat applied it to maxima and minima (q.v.). But it remained for Leibnitz and Newton to devise a general notation and to organize existing principles into a comprehensive science. The principles of Newton, which later appeared under the title of Fluxions (q.v.), were first published in his *Principia* (1687). The basal idea of his calculus is that of velocity. A line, surface, or solid is conceived as generated respectively by a moving point, line, or surface. The velocity of a moving point, and its components along the axes of coördinates for successive intervals, were called fluxions. The velocity of the moving point was called the fluxion of the arc generated, and the arc the fluent of the point's velocity. The velocity of a moving point being regarded as constant, the ratio of its component fluxions determined the nature of the path described. In general, the relation between the fluxions being given, the relations between the coördinates of the point were sought, and conversely. An elementary change in velocity (fluxion) along the X-axis was designated by x', $[x]$, or $\dot{x}$; along the Y-axis by y', $[y]$, or $\dot{y}$. Leibnitz used the symbol dx instead of x', a symbolism which has endured, while Newton's fluxional notation disappeared in the first half of the Nineteenth Century. The first publication of Leibnitz's principles appeared in the *Acta Eruditorum* (Leipzig, 1684). His method differed from Newton's, not only in its symbolism, but also in its relation to pure number. The instantaneous changes in any continuously varying magnitude, regarded by Leibnitz as taking place by infinitely small differences, savor less of mechanics than do Newton's components of velocity. The basal idea, however, in the two systems is the same, and each calculus consists of two parts—(1) differential calculus, which investigates the rules for deducing the relation between the infinitely small differences of quantities from the relation which exists between the quantities themselves; (2) the integral calculus, which treats of the inverse problem, i.e. to determine the relation of the quantities when that of their differences is known.

The influence of calculus has been so extensive on nearly all branches of mathematics that no attempt will be made in what follows to give other than the most prominent names associated with its development. The theory of infinitesimals, which lies at the foundation of differential calculus, has received adequate treatment at the hands of Gauss, Cauchy, Jordan, and Picard. With the development of the general theory of functions are connected the names of Clairaut, D'Alembert, Euler, Lagrange, Gauss, Cayley, Cauchy, Riemann, Weierstrass, and Lie; with elliptic and Abelian functions the names of Landon, Jakob Bernoulli, Maclaurin, D'Alembert, Legendre, Clebsch, Abel, Jacobi, Eisenstein, and Brioschi; with the theory of the potential, Lagrange, Green, Gauss, Dirichlet, Riemann, Neumann, Heine, and Beltrami; with differential equations, the Bernoullis, Riccati, Clairaut, Euler, Lagrange, Monge, Cauchy, Clebsch, Boole, and Lie; and with the calculus of variations, Jakob Bernoulli, l'Hôpital, Lagrange, Sarrus, Cauchy, Hesse, Clebsch, and Weierstrass.

Calculus is essentially a branch of the science of number. It differs from other branches of this science, as arithmetic and algebra, by regarding number as continuous, i.e. as being capable of gradual growth and of infinitesimal increase, while they deal with finite and discontinuous number. It differs from ordinary algebra in another respect: in the latter, the values of unknown quantities, and their relations with one another, are detected by aid of equations established between these quantities directly; in the calculus, on the other hand, the equations between the quantities are obtained by means of other equations primarily established, not between the quantities themselves, but between certain derivatives from them, or elements of them. This is an artifice of great value, since the relations between the quantities involved in any problem can, in general, more easily be inferred from equations between their derivatives than from those between themselves.

CALCULUS OF VARIATIONS. The basis of this calculus is also a method of differentiation, but of a peculiar kind. In ordinary differential calculus we seek the form which $f(x)$ assumes when x receives an indefinitely small increment, dx. In the calculus of variations, we seek the laws of the changes attending a slight alteration of the form of the function, or in the transformation of one function into another. This calculus treats the so-called isoperimetrical problems, many of which were formerly insoluble. The method has extended application in higher physics.

CALCULUS OF FINITE DIFFERENCES is a calculus concerned with the changes of functions due to finite changes in the variables involved, hence without the assumption of continuity. E, Δ, and Σ are important symbols, E denoting the operation of increasing the independent variable of a function by unity, Δ the corresponding increment of the function, and Σ the summation of all values of the function for integral values of the variable from unity to any desired number.

CALCULUS OF OPERATIONS, as the term indicates, is a systematic method of treating problems by operating algebraically upon symbols of operation. If the symbols ϕ and ψ prefixed to a quantity represent operations of the same class, the law of operations is distributive (see DISTRIBUTIVE LAW) when $\phi(x+y) = \phi x + \phi y$; the law is commutative (see ASSOCIATIVE LAW) when $\phi\{\psi(x)\} = \psi\{\phi(x)\}$. If ϕm represents the repetition of the operation ϕm times, the law of indices in ordinary algebra is expressed by

$$\phi m\{\phi^{n}(x)\} = \phi^{m+n}(x) = \phi^{n+m}(x) = \phi n\{\phi^{m}(x)\}$$

These laws are true for differentiation, for

$$d_x(u+v) = d_x(u) + d_x(v), \text{ (distributive law)}$$

$$d_x\{d_y(u)\} = d_y\{d_x(u)\}, \text{ (commutative law)}$$

$$d_x^m d_x^n(u) = d_x^{m+n}(u), \text{ (index law)}.$$

CALCULUS OF PROBABILITIES. A systematic analytic treatment of the doctrine of probability (q.v.) by use of the differential and integral calculus.

Calculus of Functions (q.v.). A systematic method of determining functions which satisfy given conditions.

Calculus, Barycentric. A method of treating geometric problems based on the mechanical theory of centres of gravity. In this calculus Möbius (1827) furnished the first example of homogeneous coördinates. See Coördinates.

Residual Calculus. A branch of integral calculus due to Cauchy, in which the integration takes place around a contour inclosing points for which the function is infinite. The integral is called the residual, and in case the contour contains all the critical points, the integral is called the total or principal residual.

Bibliography. The literature on the subject of calculus is so extensive that any limited selection of references must be unsatisfactory. The best selection of important works will be found in Meyer, *Encyklopädie der mathematischen Wissenschaften*, Vol. II. (Leipzig, 1900). Of the older works the most important are: Leibnitz, *Mathematische Schriften*, ed. by Gerhardt (Berlin and Halle, 1849-63); Newton, *Opuscula* (Lausanne, 1714); Euler, *Introductio in analysin infinitorum*, new ed. (Lausanne, 1848); id., *Institutiones calculi differentialis*, new ed. (Saint Petersburg, 1885); id., *Institutiones calculi integralis*, 3d ed. (Vienna, 1830). Of the later works may be mentioned those of Cauchy (Paris, 1821-47); Bertrand, *Traité de calcul différentiel et de calcul intégral* (Paris, 1864-70); Serret, *Cours de calcul différentiel et intégral*, 4th ed. (Paris, 1894); Hermite, *Cours d'analyse de l'école polytechnique* (Paris, 1873); Laurent, *Traité d'analyse* (Paris, 1885-91); and Jordan, *Cours d'analyse*, 2d ed. (Paris, 1893-96), which may be taken as typical of the best French works. In Germany and Austria, Schlömilch, *Compendium der höheren Analysis*, 4th ed. (Brunswick, 1895); Schlömilch, *Uebungsbuch zum Studium der höheren Analysis*, 4th ed. (Leipzig, 1888); Lipschitz, *Lehrbuch der Analysis* (Bonn, 1877-80); Stolz, *Grundzüge der Differential- und Integralrechnung* (Leipzig, 1893-99); and Riemann, *Gesammelte Werke*, edited by Weber and Dedekind, 2d ed. (Leipzig, 1892). In England, Price, *Treatise on Infinitesimal Calculus*, 2d ed. (4 vols., Oxford, 1855-89); Todhunter, *Differential Calculus* (Cambridge, 1865); and Todhunter, *Integral Calculus* (Cambridge, 1868), are widely known. Italy has recently produced a work of merit, viz., Pascal, *Lezioni di analise infinitesimale* (3 vols., Milan, 1895). Of the American works covering the general field, Byerly, *Elements of Differential Calculus* and *Elements of Integral Calculus* (Boston, 1881), are representative. For the history of the subject, consult the *Encyklopädie* mentioned above; also: Cantor, *Geschichte der Mathematik*, Vols. II. and III. (Leipzig, 1892-98); Ball, *History of Mathematics*, 3d ed. (New York, 1901); Fink, *History of Mathematics*, translated by Beman and Smith (Chicago, 1900). The *Calculus of Variations* is treated historically, as well as mathematically, by Carll (New York, 1885).

CAL'CULUS, or Stone. In medicine, a hard concretion formed within the animal body, in consequence of the deposition in the solid form of substances which usually remain in solution. (See Concretion.) The concretions most commonly termed calculi are those formed in the kidneys or bladder (urinary calculi), and those formed in the gall-bladder or biliary ducts (biliary calculi). Both of these give rise to very painful symptoms, and may even threaten life. Biliary calculi, or gallstones, may generally be presumed to exist when excessively severe pain suddenly arises in the right side, beneath the border of the ribs, and when in a few hours jaundice comes on, showing that some obstruction has existed in the outward flow of the bile. But the absolute proof that these symptoms depend on calculus is often wanting. The pain is, fortunately, transitory, but is more severe while it lasts than almost any other known form of suffering, unless it be that of a calculus in the kidney and ureter. It may be relieved by large doses of opium, but the remedy requires to be cautiously given, as even in medical hands fatal accidents have occurred. Gallstones, when impacted in the ducts, have sometimes proved fatal; but much more frequently they find their way, sooner or later, into the intestines. They are almost invariably composed of cholesterin (q.v.), with coloring matter and mucus arranged in layers in a semi-crystalline disposition. In size they vary from that of a small gravel to a diameter of over half an inch.

Urinary calculus occurs at all ages, but is most common in advanced life and in the male sex. It is very frequent in gouty persons, or among those who pursue sedentary occupations and live freely. It is rare among those who live much in the open air, or who take much violent exercise and use little animal food and wine. Among sailors it is peculiarly rare. In certain parts of England the disease is said to be frequent, as in Norfolk; and perhaps along the eastern coast of Scotland. In India, too, where some of the predisposing circumstances mentioned above can hardly be said to prevail, stone is by no means uncommon. The predisposing causes of calculus are still very imperfectly understood. In its early stages the condition usually presents itself in the form of gravel, shown by the passage of numerous very small portions of gritty concretion, which may be observed in the urine as a deposit like sand or like small grains of Cayenne pepper. When such deposits occur frequently—especially if they are present at the time of passing the urine, and not merely after it has cooled — there is reason to apprehend the subsequent formation of calculus. If, in these circumstances, there are pains of a dull character in the loins, with occasional sharper twinges, no time should be lost in seeking medical advice. If a fit of very severe pain should occur in a person for some time affected with gravel; if the urine becomes bloody; if agonizing twinges, commencing in the loins, radiate downward into the thigh or the groin, it is probable that a stone has already formed in the kidney, and is being displaced toward the bladder. Calculus in the bladder is at first attended with little suffering, as compared with that caused by the stone in its passage downward from the kidney; but unless removed or evacuated, the calculus is sure to enlarge, and it then becomes the cause of one of the most painful diseases that afflict humanity. The existence of a stone in the bladder, however, should never be assumed without a surgical examination, as all the symptoms are deceptive in certain cases. The most striking (and, perhaps, the most trustworthy) evidence of stone in the bladder, apart from the testimony of the sound (see LITHOTOMY), is smarting and burning pain experienced after the bladder has been emptied, together with occasional temporary stoppage in the flow of urine. The correct appreciation of all the symptoms, however, demands the familiarity with such cases that comes from surgical experience.

The chief varieties of urinary calculus, with respect to chemical composition, are: (1) Uric acid (red deposit); (2) urates of ammonia, soda, lime, etc. (brick-dust sediment); (3) phosphates of ammonia and magnesia, lime, etc.; (4) oxalate of lime; (5) carbonate of lime (chiefly in domestic animals); (6) cystin; (7) xanthic oxide (a very rare form, discovered by Dr. Marcet). Calculi are frequently found to be composed of numerous successive layers, each having a perfectly distinct chemical composition. Urates and phosphates in particular frequently succeed each other, and form what is called an alternating calculus. When calculus has once fairly formed in the urinary passages, no absolute cure exists except the removal of it, if possible, from the body (see LITHOTOMY; LITHOTRITY; and NEPHROTOMY); but in the stage of gravel, and still more in the earlier stages detected by careful examination of the urine, much may be done to check the tendency to this distressing and dangerous malady. The chief remedies consist in careful regulation of the diet and mode of living, together with the use of solvents adapted to the particular form of deposit found to be habitually present. Consult Park, *Surgery by American Authors* (New York, 1901). See URINE.

CALCUTTA (Hind. *Kali Ghātā*, the *ghāt*, or landing-place leading to the temple of the goddess Kali). The capital of the Province of Bengal and metropolis of British India, situated on the left bank of the river Hugli, an arm of the Ganges, in latitude 22° 35′ N., and longitude 88° 27′ E., about 100 miles from the sea by the river (Map: India, E 4). Calcutta is the headquarters of the Governor-General of India, and the seat of the Indian Government, also of the supreme courts of justice, of the court of appeals, and of a United States consulate. The appearance of the city, as it is approached by the river, is very striking. On the left are the Botanical Gardens and the Bishop's College, a handsome Gothic edifice, erected by the Society for the Propagation of the Gospel in Foreign Parts; on the right is the suburb of Garden Reach, with its handsome country seats and beautiful gardens; farther on are the Government dockyards and the arsenal; beyond these are the Maidan Esplanade, the favorite place of resort of the élite of Calcutta for their evening drive, the Eden Gardens, with their beautiful tropical trees and plants, and the splendid zoölogical gardens.

Here, near the river, lies Fort William, the largest fortress in India, occupying, with the outworks, an area of about half a mile in diameter. It is garrisoned by European and native soldiers, mounts 619 guns, and its armory contains 80,000 stands of small arms. Facing the esplanade, among other fine buildings, is the Government House, a magnificent palace erected by the Marquis of Wellesley. Beyond this, extending northward along the river-bank, is the Strand, two miles in length, and forty feet above low water, with various ghats, docks, and landing-stages for ocean liners. It is adorned with many fine buildings, including the custom-house, the new Mint, and other Government offices; and the appearance given by these and other edifices has gained for Calcutta the appellation of 'City of Palaces.' Among its other places of interest mention may be made of the principal court of justice, the town hall, a fine building, the Bengal and United Service Clubs, Writers' Building, Bank of Bengal, Jesuits' College, medical college, university, the Indian and the Economic museums, theatres, the Y. M. C. A. Building, besides various churches, mosques, Hindu temples, and pagodas, and numerous bazars. There are a number of monuments throughout the city, the most notable being those erected to the Marquis of Wellesley and Sir David Ochterlony. While the European quarter of the town is distinguished for its fine public buildings and commodious dwelling-houses, the quarters occupied by the natives present a very different appearance, their houses being, in most instances, built of mud, or bamboo and mats, and the streets narrow and unpaved. The cyclone of November, 1867, and that of June, 1870, while very destructive—in the first instance destroying 30,000 native houses—made room for considerable improvement. New and wider streets have been opened through crowded quarters and brick houses are replacing the huts.

In 1852 Calcutta was erected into a municipality, the proprietors paying assessments, and electing commissioners to apply the proceeds of these assessments in cleansing, improving, and embellishing the town. The water-supply of Calcutta is good. Formerly the water was kept in large tanks, interspersed throughout the city, whence it was borne by water-carriers or *bahisties* in large leather bags. Since the year 1865, however, excellent water has been obtained from the Hugli, about 15 miles above Calcutta, where it is filtered and sent down by pipes in the usual way. The works were further improved after 1888, and now yield a daily supply of 20,000,000 gallons. The result of this and of a system of underground drainage with an outlet in the Salt Lake has been a marked improvement in the health of the city, although more is to be desired in this direction, one-fourth of the wards remaining unsewered. A few progressive wards dispose of garbage by modern incinerators. Gas and electric lighting have taken the place of the oil lamps formerly in general use, and there are many miles of street-car lines. A canal girds a part of the city beyond the circular road.

The principal scientific and literary societies of Calcutta are the Bengal Asiatic Society, founded in 1784 by Sir W. Jones, possessing a fine library, and a valuable and extensive museum; the Bethune Society, for the promotion of intercourse between European and native gentlemen; the Dalhousie Institute, for the literary and social improvement of all classes of the community; the Bengal Social Science Association. The University of Calcutta was founded in 1857, on the same basis as the London University, and exercises functions over Bengal, the Northwest Provinces, Oudh, and the Central Provinces. Colleges have been instituted to prepare intending students. Other educational institutions are numerous in Calcutta. There are an engineering college and four Government colleges. The principal places for religious instruction are Bishop's College, intended chiefly for the education of missionaries and teachers, and the institutions of the Established and Free Churches of Scotland for the same purpose.

The communications of Calcutta afford great facilities for its extensive commerce. There are several lines of railway connecting it directly with Khulna in the delta; with Goalanda, an important centre of steamship traffic on the Brahmaputra; with Darjiling in the Himalayas, and with Diamond Harbor and Port Canning. The lines to northwest India and to Bombay start from Howrah, on the opposite side of the Hugli. Calcutta has telegraphic connection with the principal towns of India and communicates with Europe by several lines. Continuous communication, greatly facilitated by the Suez Canal, is kept up with Great Britain by numerous well-appointed steamers and sailing vessels. The river adjacent to the city varies in breadth from a quarter of a mile to nearly a mile. There are dry docks and wet docks. The city has water communication in three directions—to the east by various rivers leading to the Brahmaputra; to the north by the Hugli and the Nadiya rivers leading to the Ganges; to the west by the Midnapur Canal. The port has excellent anchorage and is the lowest of several seaports on the Hugli, which is navigable by sea-going vessels. The port extends for about 10 miles along the river and is somewhat less than 2 miles in breadth at its broadest part, the area being about 8 square miles, and comprised for the most part between the rivers and the circular road, a spacious roadway which marks the landward boundary of the city proper. Beyond this road there lie extensive suburbs, the chief of which are Chitpur, on the north; Nundeu Baugh, Bahar-Simleah, Sealdah, Entally, and Baliganj, on the east; and Bhawaripur, Allipur, and Kidderpur, on the south. The municipality of Howrah, situated on the opposite side of the river and connected with Calcutta by a pontoon bridge, contains the salt-golahs or warehouses of the Government, extensive manufactories, dock-yards, ship-building establishments, and the depot of the East India Railway.

One-third of the whole trade of India passes through Calcutta. The exports are jute, opium, cotton, rice, wheat, sugar, indigo, coffee, tea, saltpetre, linseed, shellac, buffalo-horns, hides, castor-oil, cutch, gunny bags, etc. As a central depot for the richest parts of India, Calcutta has an extensive inland trade. The principal industrial establishments include sugar-refineries, cotton-manufactories, flour, saw, and oil mills, and ship-building docks. Several newspapers are published. There are a few banks and numerous insurance and other companies, with a chamber of commerce. Living is comparatively cheap, and most of the luxuries of life, as well as its necessaries, are to be had as readily as in most European towns. The annual fall of rain averages 64 inches; the temperature in the shade ranges in July from 78° to 87°, and in December from 60° to 79°. In 1837 the population of the town proper amounted to 229,700; it had increased by 1881 to 612,307; in 1891 to 861,764, with suburbs (excluding Howrah, which had 116,606); and in 1901 to 1,121,700, when Howrah also had 157,850. Besides these, thousands of the 3,500,000 who sleep at night in the surrounding districts of Hugli and the twenty-four suburban Parganas flock during the day to Calcutta on foot, by boat, or by railway, to their daily toil. The inhabitants are mostly Hindus and Mohammedans. The Christians number only about 30,000. There is a considerable number of Europeans and of Eurasians, with some Armenians, Greeks, Jews, Parsees, and negroes. Calcutta was the birthplace of William Makepeace Thackeray.

Calcutta was founded by Governor Charnock in the year 1686, by the removal hither of the factories of the East India Company. In 1700 three villages surrounding the factories having been conferred upon the company by the Emperor of Delhi, in recognition of a present made to Azim, a son of Aurungzebe, they were forthwith fortified and received the name of Fort William in honor of the reigning King; but the place was subsequently termed Calcutta, the name of one of the villages. In 1707 Calcutta had acquired some importance as a town, and was made the seat of a presidency. In 1756 it was unexpectedly attacked by Surajah Dowlah, the Nawab of Bengal, and compelled to yield after a two days' siege; 146 men fell into the enemy's hands, and these were cast at night into the notorious 'Black Hole' (q.v.), only 23 surviving the horrors of that night. The city remained in the hands of the enemy until eight months afterwards, when Clive, in conjunction with Admiral Watson, recaptured the place, and afterwards concluded peace with the Nawab. Soon after this, and subsequent to the decisive victory of Plassey, the possessions of the East India Company were greatly extended by means of grants made by the Emperor of Delhi, and Calcutta once more resumed its career of progress and prosperity. Consult Stevens, "The Port of Calcutta," in Vol. XLVII., *Society of Arts Journal* (London, 1899); Stevenson, "Calcutta," in *Outing*, Vol. XXXI. (New York, 1900).

CALDANI, kȧl-dä′nė, Leopoldo Marc Antonio (1725-1813). An Italian anatomist, born in Bologna. In 1771, on the death of Morgagni, the celebrated anatomist of Padua, Caldani was chosen his successor in the professorship. At the age of 76 he published his principal work, *Icones Anatomicæ*, a series of anatomical plates. He also published *Institutiones Physiologicæ* (1772) and other works.

CALDARA, kȧl-dä′rȧ, Antonio (1678-1736). An Italian composer, born in Venice. He studied there under Legrenzi and became a singer in the Chapel of San Marco. In 1714 he was appointed *maestro di cappella* in Mantua, and from there went to Vienna, where Charles VI. made him one of his vice-chapelmasters and took lessons from him. Caldara is noted rather for the quantity than the quality of his works. He was a most prolific composer for the stage and the Church, and his orchestration was often very elaborate. He composed 69 operas and oratorios, including the celebrated *Crucifixus* (1840), and numerous purely religious productions.

CALDARA, Polidoro. See Poilidoro da Caravaggio.

CALDAS, käl′dȧs (Sp. plur. of *calda*, Lat. *calida*, warm water, Lat. *calidus*, hot). A Spanish term for warm springs applied to numerous places on the Iberian Peninsula on account of their thermal springs. The chief of them are Caldas de Malavella, Caldas d'Estrach, and Caldas de Montbuy, in Catalonia; Caldas de Reyes, Caldas de Taipas, Caldas de Faveios, Caldas de Rainha, Caldas de Gerez, in Portugal. The name is also common in the topography of South America, as Caldas de Minas Geraes, Brazil.

CALDAS, Francisco José de (c.1770-1816). A South American naturalist, born at Popayan, New Granada. He traveled extensively through that country and Peru, and in 1804, by means of a barometer and a sextant constructed by himself, measured Mount Chimborazo, Mount Tunguragua, and several other peaks. He was in charge of the observatory established at the beginning of the century at Santa Fé de Bogotá, and his valuable observations were published in the *Semenario de la Nueva Granada*, the first number of which was issued in 1807 (republished by A. Lasserre, Paris, 1849). Upon the outbreak of the revolution of 1816, Caldas embraced the cause of independence, was condemned to death by Morillo, and executed.

CALDAS-BARBO'SA, Domingos (1740-1800). A Brazilian poet. He was born in Rio de Janeiro, and was the son of a freed negress. He entered the army, participated in the siege of Colonia do Sacramento in 1762, and afterwards went to Lisbon, where he took holy orders. His great improvisational gifts made him a favorite with the best society of Lisbon. His poems are tinged with melancholy and are somewhat pessimistic in tone. Many of them have been collected and published under the title, *A Viola de Loreno.*

CALDECOTT, kạl'de-kot, Randolph (1846-86). An English illustrator, born in Chester. In early life he was a bank clerk; as an artist he was self-taught. About 1871 he went to London, and a year afterwards settled there, and began regularly to contribute drawings to the leading magazines. His first illustrations were done for Washington Irving's *Old Christmas* (1875). Among others are those for Irving's *Bracebridge Hall* (1876), and for books by Mrs. Ewing and Mrs. Locker. But his best work is a series of children's picture-books, illustrated in color. The series began with *John Gilpin* (1878), and ended with *The Great Panjandrum Himself* (1885). His depiction of country life and animals rivals Leech in humor and draughtsmanship.

CALDERA, kȧl-dā'rȧ (Sp., kettle, Engl. *caldron*, referring to the hollow depression of volcanic origin). A seaport of Chile, in the Province of Atacama (Map: Chile, C 9). It has an excellent harbor, protected by breakwaters; and exports silver and copper, being the port for the productive mining district centring at Copiapó, with which it is connected by rail. There are silver and copper smelters here. The town is the seat of a United States consular agent. Population, in 1895, 1878.

CALDERON, käl'dȧ-rōn', Don Serafin Estébanez (1801-67). A Spanish poet and novelist. He was born in Malaga in 1801, studied law at the University of Granada, and in 1822 was made professor of poetry and rhetoric there. A volume of poems which he published shortly after procured for him some distinction. Subsequently, he became an advocate in his native city, but still continued faithful to the Muses. In 1830 he went to Madrid, where he published anonymously his only volume of poems under the title *El solitario* (1831). He also wrote several articles on Andalusian manners for the *Cartas Españolas*, the only literary journal at that period in Spain. In 1836 he was appointed Civil Governor of Logroño, but an accident obliged him to return to Madrid, where he devoted himself to collecting MSS. of the old national literature, to be the basis of a great critical edition of the *Cancioneros* and *Romanceros.* Calderon wrote also a fine novel, *Cristianos y Moriscos* (1838). To the literature of the Spanish Moors he paid great attention. His *Escenas andaluzas* (1847) are a series of lively sketches of Andalusian life. At his death, February 5, 1867, he left behind him a work on the *Expediciones y aventuras de los Españoles en Africa.* The Spanish Government purchased his very valuable library. Consult Cánovas del Castillo, *El solitario y su tiempo*, etc. (Madrid, 1883).

CALDERON, Francisco Garcia (1834—). A Peruvian statesman, born in Arequipa. He became professor of jurisprudence at the age of 21, was elected to the Peruvian Congress in 1867, and in 1868 became Minister of the Treasury. After the occupation of Lima by the Chilean Army in 1881, and the flight of President Piérola, Calderon was elected Provisional President of Peru. In this capacity he attempted to treat with the civilians and to secure the coöperation of the United States. These plans were frustrated by the Chileans, who sent him to Valparaiso as a prisoner. Upon his return to Lima in 1886, he became president of the Senate. He was influential in arranging the Grace contract, by means of which great improvements were made in the finances of Peru. His principal publication is the *Dictionary of Peruvian Legislation.*

CALDERON, kăl'dĕr-on, Philippe Hermogène (1833-98). An English subject and portrait painter of Spanish extraction, born in Poitiers. He studied with J. M. Leigh in London and with Picot in Paris, but established himself in London, where his first picture, "By the Waters of Babylon," was exhibited at the Royal Academy in 1853. Among his most noteworthy paintings are the following: "Her Most High, Noble, and Puissant Grace" (1866); "The British Embassy at Paris during the Massacre of Saint Bartholomew" (1863); "Joan of Arc" (1877); "The Renunciation of Saint Elizabeth of Hungary" (1891).

CALDERON, Bridge of. See Puento de Calderon.

CALDERON DE LA BARCA, käl'dȧ-rōn' dȧ lȧ bär'kȧ, Pedro (1600-81). An eminent Spanish dramatic poet, next to Lope de Vega, Spain's greatest dramatist, and the most typically national Spanish writer of his century. He came of a good old family, and was born January 17, 1600, in Madrid, where his father was employed in the department of the treasury; was educated at the Jesuit college in that city, and tradition says, as it did of Cervantes, that he studied for a time in Salamanca. His first play was written at the age of 13, and at 22 he won a prize in a poetical contest which called forth warm praise from Lope de Vega. Ten years of military service followed, in Italy and Flanders, though there is some discrepancy in dates. But in 1635 he is once more in Madrid, writing for the stage. Two years later he received the Order of Santiago, and in 1648 had to interrupt the composition of a play in order to join his fellow knights in a campaign against the Catalan rebels. In 1651 he followed the example of Lope de Vega and entered the priesthood, becoming successively chaplain at Toledo, honorary chaplain to Philip IV., and superior of the Brotherhood of San Pedro in Madrid. Yet he still continued to write for the stage, and when he died, May 5, 1681, he was engaged upon a new *auto sacramental*, a form of religious play in which he excelled all his predecessors. His friend De Solis wrote of him, "He died, as they say the swan dies, singing."

With Calderon the golden period of Spanish drama comes to a close. He found it at its height, and he exhausted, one after another, the possibilities of its several types. As to the rank which should be assigned him, it must be borne in mind that he wrote not for the world, but for the narrow circle of his own age and country. He was essentially, fundamentally local; he lacked the universality, the wide humanity of Shakespeare, to whom, curiously enough, Friedrich Schlegel found him superior. He lacked the gift of finely differentiating his characters. They stand less for individuals than for personifications of certain primitive and dominant passions, love, hate, pride, charity, revenge. His leading motives are limited in number; they almost narrow down to the three sentiments of loyalty to the King, devotion to the Church and the 'point of honor,' or vengeance inflicted by husband, father, or brother upon an erring woman. Perhaps nothing serves better to illustrate his circumscribed outlook upon life than the plays in which this last theme is treated. His heroes have nothing of the lofty passion of an Othello, the sublimity of a noble nature gone astray. They impress one rather as cold-blooded executioners, sensitive only to the fear of being made to appear absurd. There is much significance in the fact that of all the surviving plays of Calderon, only three have been found capable of production on the modern stage.

Many critics think that Calderon was at his best as a writer of *autos*, or religious plays, which closely resemble the mystery plays of the Middle Ages, and in their more specialized form are a sort of dramatized exposition of the mystery of the blessed eucharist, intended for performance on Corpus Christi day. Of these *autos*, nearly eighty are extant, although the number varies in different authorities, who sometimes fail to distinguish between the *auto* and the more secular *comedia devota*. Of the regular dramas, there are about 120 surviving, of which the best known are *El Alcalde de Zalamea; El principe constante* (an historical play dealing with Prince Ferdinand of Portugal); *La dama duendo* (The Fairy Lady); *El médico de su honra; El pinto de su deshonra:* and *El mayor monstruo los zelos* (No Monster Like Jealousy).

Editions of Calderon are: Keil's (Leipzig, 1827); Hartzenbusch's (Madrid, Rivadeneyra, 4 vols, 1872-74); and Garcia Ramen (Madrid, 1882); a German translation of the plays, by J. D. Gries (9 vols., Berlin, 1862). There are English translations of selected plays by M'Carthy (1854-73); Edward Fitzgerald (3 vols., 1853): Archbishop Trench (1856); and N. MacColl (1888). Consult: Schmidt, *Die Schauspiele Calderons* (Elherfeld, 1857); Trench, *Essay on the Life and Genius of Calderon* (London, 1880); Menendez y Pelayo, *Calderon y su teatro* (Madrid, 1881); Günthner, *Calderon und seine Werke* (Freiburg, 1888).

CALDERON THE COURTIER. A story of Spanish romance by Bulwer Lytton (1838).

CALDERWOOD, kąl'dẽr-wụd, David (1575-1650). A Scottish divine and ecclesiastical historian. He was born in Dalkeith, of a good family, and about 1604 was settled as Presbyterian minister of Crailing, Roxburghshire, a few miles southeast of Edinburgh. Opposed to the designs of James VI. for the establishment of Episcopacy in Scotland, on that monarch's visit to his native country in 1617, he and other ministers signed a protest against a bill, then before the Scottish Parliament, for granting the power of framing new laws for the Church to an ecclesiastical council appointed by the King, and in consequence he was summoned before the high commission of Saint Andrews. Refusing to submit, he was committed to prison for contumacy, and then banished the kingdom. He retired to Holland, 1619, and in 1621, in English, and in 1623, in Latin, published at Leyden, under the pseudonym Edwardus Didoclavius, an anagram on his name, Latinized, his celebrated controversial work, entitled *Altare Damascenum*, etc., in which he rigorously examined the origin and authority of Episcopacy, and which has been a storehouse of information and argument in favor of Presbyterianism. After King James's death, in 1625, he returned to Scotland, and for some years was engaged collecting all the memorials relating to the ecclesiastical affairs of Scotland, from the beginning of the Reformation there to the death of James VI. In 1640 he became minister of Pencaitland, near Edinburgh, and in 1643 was appointed one of the committee for drawing up the Directory for Public Worship in Scotland. He died at Jedburg, October 29, 1650. From the original MS. of his *History of the Kirk of Scotland*, preserved in the British Museum, an edition, with a life, by the Rev. Thomas Thomson, was printed for the Woodrow Society, in 8 vols. (Edinburgh, 1842-49).

CALDERWOOD, Henry (1830-97). A Scotch clergyman and philosopher, born at Peebles. He was educated at Edinburgh University in 1847-52, studied theology, 1852-56, and was minister of Greyfriars Presbyterian Church, Glasgow, in 1856-58. He was examiner in mental philosophy at the University of Glasgow from 1861 to 1864, and from 1868 until his death was professor of moral philosophy at Edinburgh University. He published *The Philosophy of the Infinite* (1854); *Handbook of Moral Philosophy* (1872); *The Relations of Mind and Brain* (1879); *The Relations of Science and Religion* (1881); and *Evolution and Man's Place in Nature.*

CALDICOTT, kąl'dĭ-kot, Alfred James (1824—). An English musician and composer, born in Worcester. He studied at the Leipzig Conservatory under Richter, Moscheles, and others; became organist of Saint Stephen's Church, Worcester, and in 1882 was appointed to a professorship at the Royal College of Music, London. His works include many songs and glees; the cantatas *The Widow of Nain* (1881) and *A Rhine Legend* (1883); and the operettas *A Moss-Rose Rent* (1883) and *Old Knockles* (1884).

CALDIERO, käl-dyā'rô (anciently Lat. *Caldarium*, hot baths, from *calidus*, warm). A decayed town in north Italy, 8 miles east of Verona. Its hot sulphur springs were known to the Romans, hence the name Caldarium (Map: Italy, F 2). Here on November 12, 1796, the Austrians repulsed Napoleon, and on October 29-31, 1805, a series of bloody battles between the Austrians under Archduke Charles and the French under Masséna occurred.

CALDWELL, kạld'wĕl. A town and county-seat of Warren County, N. Y., 62 miles north of Albany, the terminus of a branch of the Delaware and Hudson Railroad (Map: New York, G 2). A picturesque location, at the southern end of Lake George, amid mountain scenery, vies with historical associations in making the locality popular as a summer resort. Forts George and William Henry were located here. Population, in 1890, 1377; in 1900, 1465.

CALDWELL. A village and county-seat of Noble County, Ohio, 35 miles north of Marietta, on the Cleveland and Marietta and the Bellaire, Zanesville and Cincinnati railroads (Map: Ohio, H 6). It is a coal and iron mining, and oil-producing region. Population, in 1890, 1248; in 1900, 927.

CALDWELL. A town and county-seat of Burleson County, Tex., about 85 miles east by north of Austin, on the Gulf, Colorado and Santa Fé Railroad (Map: Texas, F 4). It has a trade in the products of an agricultural and stock-raising region, and contains brick-yards, cotton-gin, grist and oil mills, marble-works, etc. Population, in 1890, 1250; in 1900, 1535.

CALDWELL, CHARLES HENRY BROMEDGE (1823-77). An American naval officer. He was born in Hingham, Mass., and entered the United States Navy in 1838. He took part in the bombardment of Forts Jackson and Saint Philip in 1862, and commanded the mortar flotilla in the operations at Port Hudson in 1863. In 1870 he became chief of staff in the North Atlantic Squadron. He reached the grade of commodore in 1874.

CALDWELL, JAMES (1734-81). An American clergyman, best known as 'the soldier's parson.' He was born in Virginia, graduated at Princeton in 1759, became pastor of the Presbyterian Church at Elizabethtown, N. J., in 1762, and was a zealous patriot during the Revolution. In 1780 the Tories burned his house and church, and soon afterwards a British force from Staten Island fell upon the village of Connecticut Farms (now Union, N. J.), where Caldwell's wife and children had taken refuge, and murdered his wife while she was praying with her children. The story is told of Caldwell's distributing hymn-books to some soldiers who were short of wadding, with the exhortation, "Now, boys, put Watts into them." He was shot and killed by a patriot sentinel during a dispute about a package that the soldier declared it his duty to examine. The soldier was tried by the civil authorities for murder, and was convicted and executed. A fine monument to Caldwell was dedicated at Elizabethtown on the sixty-fourth anniversary of his death.

CALDWELL, SAMUEL LUNT (1820-89). An American educator. He was born in Newburyport, Mass., and graduated from Waterville (now Colby) College in 1839, and from Newton Theological Institution in 1845. He held pastorates in Bangor, Maine, and Providence, R. I., for twenty-seven years, and was professor of Church history at the Newton Seminary from 1873 to 1878. He then became second president of Vassar College, succeeding Dr. J. H. Raymond, and held this position until 1885.

CA'LEB (dog). The name both of an individual and of a Kenizzite clan, mentioned in I. Sam. xxv. 3; Num. xxxii. 12; Judges i. 15; I. Chron. ii. 9 *al.* It was probably of Edomitish origin. Before the time of David (c.1033-993 B.C.), it was established in Hebron and its neighborhood. Caleb ben Jephunneh is the eponymous hero of the clan, representing its advance from Arabia into the Negeb. In the story of the spies, Num. xiii. 6, it even represents Judah. Post-exilic genealogies connect Caleb closely with Jerahmeel, as a younger brother, and both through Hezron and Perez with Judah. It is possible that these genealogies reflect vaguely the outlines of a history, of which northwestern Arabia and the Negeb were the scenes, before the different elements were welded together into the kingdom of Judah by David.

CALEB. (1) The foster-mother of Saint George in the *Seven Champions of Christendom.* (2) A caricature of Lord Grey of Wark, in Dryden's *Absalom and Achitophel.*

CALEB WILLIAMS. A novel by William Godwin, published in May, 1794. It is a study in the relativity of ethics. For the plot, see FALKLAND. It was dramatized by Colman the Younger. See IRON CHEST, THE.

CAL'EDO'NIA (Lat., Gk. Καληδονία, *Kalēdonia*, still retained in Cymr. *Coed Celyddon*, Caledonian Forest). The name given to the northern part of Britannia, beyond the firths of Forth and Clyde, by Tacitus and the later Romans. The derivation is very uncertain. Agricola attempted the conquest of Caledonia, which he invaded in A.D. 80 and the following years. In 84 he defeated Galgacus, who had formed a union of all the tribes, but was prevented, by his recall, from pursuing the conquest. Later Hadrian, Septimius Severus, and others attempted to subdue Caledonia, but the inhabitants succeeded in maintaining their independence. The natives made constant incursions into Britain. In the Fourth and Fifth centuries, under the names of Scots and Picts (q.v.), they preyed upon the Britons, especially after the withdrawal of the Roman legions, until the island was occupied by the Angles and Saxons. See BRITANNIA, and SCOTLAND.

CALEDONIA, NEW. See NEW CALEDONIA.

CAL'EDO'NIAN CANAL. A chain of natural lakes in Scotland, 62 miles long, united by artificial canals and traversing the Great Glen of Albin, in Inverness-shire, from northeast to southwest, and connecting the North Sea with the Atlantic. The lakes are Beauly, Ness, Oich, Lochy, Eil, and Linnhe (Map: Scotland, D 2). They communicate by cuts 120 feet broad at the surface, 50 feet at the bottom, and 17 feet deep, the total length of these artificial channels being 23 miles. The canal was formed to avoid dangerous and tedious navigation by the Pentland

Firth, Cape Wrath, and the Hebrides; the distance between Kinnaird's Head and the Sound of Mull by this route being 500 miles, but by the canal 250, with an average saving of 9½ days for sailing vessels. The highest part is Loch Oich, 105 feet above the sea. There are 28 locks, each 170 to 180 feet long, and 40 feet wide, with a rise or lift of water of 8 feet. Eight of the locks, called Neptune's staircase, occur in succession near the west end of the canal. Begun under Telford, in 1803, the canal was opened in 1823. Ships of 500 to 600 tons can pass through. It is chiefly used by fishing-boats and for local traffic, and in the summer season is much frequented by tourists attracted by the picturesque scenery and points of interest on both sides of the canal.

CAL'EDO'NIA SPRINGS. A health resort in Prescott County, Ontario, Canada, about 10 miles southwest of Orignal, and 60 miles nearly due west of Montreal (Map: Quebec, C 5). It is famous for its alkaline springs.

CA'LEF, or **CALFE,** Robert (c.1648-1719). A Boston merchant, who published, in 1700, *More Wonders of the Invisible World*, a satirical reply to Cotton Mather's *Wonders of the Invisible World* (1692). His argument against the witchcraft persecutions and his attack on Mather called out from the latter's parishioners, in defense of their pastor, *Some Few Remarks upon a Scandalous Book Against the Government and Ministry of New England*. Calef's book was also publicly burned at Cambridge by order of Increase Mather, then president of Harvard College.

CALENDAR (Lat. *calendarium*, account-book, interest falling due on the calends, from *calendæ*, calends). The mode of adjusting the months and other divisions of the civil year to the natural or solar year. The necessity of some division and measurement of time must have been early felt. The phases or changes of the moon supplied a natural and very obvious mode of dividing and reckoning time, and hence the division into months (q.v.; see also Week) of 29 or 30 days was, perhaps, the earliest and most universal. But it would soon be observed that, for many purposes, the changes of the seasons were more serviceable as marks of division; and thus arose the division into years (q.v.), determined by the motions of the sun. It was soon, however, discovered that the year, or larger division, did not contain an exact number of the smaller divisions or months, and that an accommodation was necessary; and various not very dissimilar expedients were employed for correcting the error that arose. The ancient Egyptians had a year determined by the changes of the seasons, without reference to the changes of the moon, and containing 365 days, divided into twelve months of 30 days each, with five supplementary days at the end of the year. The Jewish year consisted, in the earliest periods, as it still does, of twelve lunar months, a thirteenth being from time to time introduced, to accommodate it to the sun and seasons. This was also the case with the ancient Syrians, Macedonians, etc. The Jewish months have alternately 29 and 30 days; and in a cycle of 19 years there are 7 years having the intercalary month, some of these years having also one, and some two days more than others, so that the length of the year varies from 353 to 385 days. The Greeks, in the most ancient periods, reckoned according to real lunar months, twelve making a year; and about B.C. 594 Solon introduced in Athens the mode of reckoning alternately 30 and 29 days to the month, accommodating this civil year of 354 days to the solar year by occasional introduction of an intercalary month. A change was afterwards made, by which three times in 8 years a month of 30 days was intercalated, making the average length of the year 365¼ days. See Metonic Cycle.

The Romans are said to have had originally a year of 10 months; but in the time of their kings they adopted a lunar year of 355 days, divided into 12 months, with an occasional intercalary month. Through the ignorance of the priests, who had the charge of this matter, the utmost confusion gradually arose, which Julius Cæsar remedied (B.C. 46) by the introduction of the Julian Calendar, according to which the year has ordinarily 365 days, and every fourth year is a leap year of 366 days—the length of the year being thus assumed as 365¼ days, while it is in reality 365 days, 5 hours, 48 minutes, and 46 seconds; or 11 minutes, 14 seconds less. Cæsar gave the months the number of days they still have. See Kalends.

So perfect was the Julian style of reckoning that it prevailed generally among Christian nations, and remained undisturbed till the accumulation of the remaining error of 11 minutes or so had amounted, in 1582, to 10 complete days, the vernal equinox falling on the 11th instead of the 21st of March, as it did at the time of the Council of Nice, A.D. 325. This shifting of days had caused great disturbances, by unfixing the times of the celebration of Easter, and hence of all the other movable feasts, and accordingly, Pope Gregory XIII., after careful study, with the aid of Clavius, the astronomer, ordained that 10 days should be deducted from the year 1582, by calling what, according to the old calendar, would have been reckoned the 5th of October the 15th of October, 1582; and, in order that this displacement might not recur, it was further ordained that every hundredth year (1800, 1900, 2100, etc.) should not be counted a leap year, excepting every fourth hundredth, beginning with 2000. In this way the difference between the civil and natural year will not amount to a day in 5000 years. In Spain, Portugal, and part of Italy, the Pope was exactly obeyed. In France the change took place in the same year, by calling the 10th the 20th of December. In the Low Countries the change was from the 15th December to the 25th; but it was resisted by the Protestant part of the community till the year 1700. The Catholic nations, in general, adopted the style ordained by their sovereign pontiff; but the Protestants were then too much inflamed against Catholicism in all its relations to receive even a purely scientific improvement from such hands. The Lutherans of Germany, Switzerland, and, as already mentioned, of the Low Countries, at length gave way in 1700, when it had become necessary to omit 11 instead of 10 days. A bill to this effect had been brought before the Parliament of England in 1585, but does not appear to have gone beyond a second reading in the House of Lords. It was not till

1751, and after great inconvenience had been experienced for nearly two centuries, from the difference of the reckoning, that an act was passed (24 Geo. II., 1751) for equalizing the style in Great Britain and Ireland with that used in other countries of Europe. It was then enacted that 11 days should be omitted after the 2d of September, 1752, so that the ensuing day should be the 14th. A similar change was about the same time made in Sweden and Tuscany, and Russia is now the only country which adheres to the old style; an adherence which renders it necessary, when a letter is thence addressed to a person in another country, that the date should be given thus: April $\frac{1}{13}$ or $\frac{\text{June 27}}{\text{July 9}}$. It will be observed that the years 1800 and 1900, not being considered by us as leap years, have interjected two more days, making the difference thirteen days between old and new style.

French Revolutionary Calendar. The French nation, in 1793, undertook the task of making a new calendar, professedly upon philosophical principles. The new era was dated from the minute of the autumnal equinox (September 22, 1792), which was also the day from which the existence of the Republic was reckoned (although the formal proclamation of the Republic was on September 21). There were 12 months of 30 days each, divided into decades, in which the days were named numerically—Primidi, Duodi, and so on, up to Decadi. The remaining five days were grouped as festal days at the end of the year, and known as *Sansculottides*. The months, seasons, and festivals were arranged as follows (the table being for the years I., II., III., V., VI., VII., the dates varying by one or two days in the remaining years):

AUTUMN.

Vendémiaire	Vintage month	22 Sept to 21 Oct.
Brumaire	Fog month	22 Oct. to 20 Nov.
Frimaire	Sleet month	21 Nov. to 20 Dec.

WINTER.

Nivôse	Snow month	21 Dec. to 19 Jan.
Pluviôse	Rain month	20 Jan. to 18 Feb.
Ventôse	Wind month	19 Feb. to 20 Mar.

SPRING.

Germinal	Seed month	21 Mar. to 19 April
Floréal	Blossom month	20 April to 19 May
Prairial	Pasture month	20 May to 18 June

SUMMER.

Messidor.	Harvest month	19 June to 18 July
Fervidor, or Thermidor	Heat month	19 July to 17 Aug.
Fructidor	Fruit month	18 Aug. to 16 Sept.

SANSCULOTTIDES, OR FEASTS DEDICATED TO

Les Vertus	The Virtues	17 Sept.
Le Génie	Genius	18 Sept.
Le Travail	Labor	19 Sept.
L'Opinion	Opinion	20 Sept.
Les Récompenses	Rewards	21 Sept.

A sixth additional day in leap years was named *le jour de la Révolution*. This calendar was a product of the revolt against Christianity, and it existed until the old system was restored by Napoleon, December 31, 1805. See CHRONOLOGY.

Perpetual Calendar. An arrangement for ascertaining the day of the week corresponding to any desired date, and for solving other similar problems. The following form of perpetual calendar was arranged by Capt. J. Herschel, and is probably the best yet devised. As here given, it covers the period from 1798 to 1950, but it can be extended easily in either direction.

Every date is composed of four elements, viz.:

(1) Day of the week.
(2) Day of the month.
(3) Name of the month.
(4) Number of the year.

Any three of these elements being given, we can find the fourth from the perpetual calendar. Thus, suppose we wish to find what day of the week corresponded to March 4, 1865, on which day Lincoln was inaugurated President of the United States for the second time. Entering the calendar in the column headed 'March,' and opposite the 'day of the month' 4, we find the sign +. Now, entering the column containing the year 1865, and going up it to the same sign +, we find opposite that sign, on the right, the 'day of the week' Saturday. Accordingly, Lincoln was inaugurated on a Saturday.

Again, suppose it is required to find in what years

PERPETUAL CALENDAR

DAY OF THE MONTH					Jan. Oct.	Apr. July *Jan.*	Sept. Dec.	June	Feb. Mar. Nov.	Aug. *Feb.*	May	
1	8	15	22	29	×	+	=	•	||	‡	§	Monday
2	9	16	23	30	§	×	+	=	•	||	‡	Tuesday
3	10	17	24	31	‡	§	×	+	=	•	||	Wednesday
4	11	18	25	32	||	‡	§	×	+	=	•	Thursday
5	12	19	26		•	||	‡	§	×	+	=	Friday
6	13	20	27		=	•	||	‡	§	×	+	Saturday
7	14	21	28		+	=	•	||	‡	§	×	Sunday
					1798	1799	1800	1801	1802	1803	……	
					1804	1805	1806	1807	……	1808	1809	
					1810	1811	……	1812	1813	1814	1815	
					……	*1816*	1817	1818	1819	……	*1820*	
					1821	1822	1823	……	*1824*	1825	1826	
					1827	….	*1828*	1829	1830	1831	……	
					1832	1833	1834	1835	……	*1836*	1837	
					1838	1839	……	*1840*	1841	1842	1843	
					……	*1844*	1845	1846	1847	……	*1848*	NOTE
					1849	1850	1851	……	1852	1853	1854	The *italic* months are for use in bissextile years only. No attention need be paid to leap years, unless the date falls in January or February.
					1855	……	*1856*	1857	1858	1859	……	
					1860	1861	1862	1863	……	*1864*	1865	
					1866	1867	…..	*1868*	1869	1870	1871	
					……	*1872*	1873	1874	1875	……	*1876*	
					1877	1878	1879	……	*1880*	1881	1882	
					1883	……	*1884*	1885	1886	1887	……	
					1888	1889	1890	1891	……	*1892*	1893	
					1894	1895	……	*1896*	1897	1898	1899	
					1900	1901	1902	1903	……	*1904*	1905	
					1906	1907	……	1908	1909	1910	1911	
					……	*1912*	1913	1914	1915	… ..	*1916*	
					1917	1918	1919	……	*1920*	1921	1922	
					1923	……	*1924*	1925	1926	1927	… …	
					1928	1929	1930	1931	……	*1932*	1933	
					1934	1935	… ..	*1936*	1937	1938	1939	
					……	*1940*	1941	1942	1943	……	*1944*	
					1945	1949	1947	……	*1948*	1949	1950	

March 4 (inauguration day) can fall on a Sunday. As before, for March 4 we find the sign +. Opposite Sunday we find that sign in the first column of years, beginning with 1798, 1804, etc. In all the years in this column, therefore, March 4 will fall on a Sunday. But Presidential inaugurations usually occur only in years following leap years, which latter are indicated by *italics* in the perpetual calendar. Consequently, Sunday inaugurations occurred in 1821, 1849, 1877, and will occur in 1917, 1945.

Primitive Calendar. Among Amerind tribes, inchoate writing in the form of a rude inscription, sometimes called 'winter count,' recording notable events in the life of an individual or the history of a tribe. The woodland tribes made the inscriptions on trees or on birch bark; dressed skins were used by the tribes of the prairies; some of the tribes of the arid regions (e.g. the Pima) incised rude mnemonic symbols on canes or wands; while in Mexico and Yucatan calendric inscriptions of related character, although recorded in more or less arbitrary glyphs, rather than rude ideographs or ikonographs, were preserved in scrolls or books of maguey paper. See Archæology, American; and Man, Science of.

CALENDAR. In general, an orderly list of things, especially with reference to dates, or of events. Specifically:

Calendar of Court, the official list of causes pending in the court for trial or argument. It generally contains the names of the parties and of their attorneys, as well as the date and nature of the issue, i.e. whether of fact or of law. Ordinarily, the causes are entered in the order of their date of issue (q.v.), the first one being that in which issue has been joined the longest; but the statutes and court rules give precedence to some cases over others. Certain actions brought by the United States or by a State may be advanced and tried out of their chronological order. Criminal cases are entitled to a preference over civil suits, and among criminal cases those for capital offenses have precedence over others.

Calendar of Prisoners. In England, a sheriff's certified list of all prisoners in his custody awaiting trial for felony, prepared for a court sitting under a commission of jail delivery (q.v.). In the United States similar lists are often required, either of the sheriff or of the keeper of a prison.

CALENDERING (Fr. *calandre*, roller, from Lat. *cylindrus*, Gk. κύλινδρος, *kylindros*, cylinder, roller). The term applied to the finishing process by which a glazed or polished surface is given to paper and various textile fabrics, such as linen and cotton. It is usually done by passing the fabric between cylinders or rolls under pressure, hence the origin of the term, which is a corruption of cylindering. The familiar domestic process of starching and ironing illustrates in a simple form the object and result of calendering, and the common domestic mangle is a near approach in a simple form of the large calendering machines used in paper and textile manufacture. These machines consist of a series of from three to twelve rolls or 'bowls' set one above the other in a strong iron frame and so arranged that heavy pressures can be brought to bear on the rolls, and, therefore, on the fabric which is passed between them. The rolls were formerly made of wood, but this material proved unsatisfactory because it warped. At present, when metal rolls are not used, the rolls are made of paper or cotton rendered solid by hydraulic pressure. Metal rolls are made of steel, chilled cast iron, or brass, and are often made hollow, to allow them to be heated internally where hot calendering is required. The process of calendering consists in passing the fabric between the rolls a number of times, depending upon the material and the finish required. Often cloths are starched before being calendered. To impart a glaze or polish one of the pair of rolls is made to revolve faster than the other, which causes it to slide on the fabric, with exactly the same effect as results from the sliding back and forth of the flatiron in 'ironing' or polishing the domestic linen. Sometimes the surfaces of the rolls have slightly raised patterns which produce the effect known as watering. In making the rolls for calendering the utmost accuracy of workmanship is exercised to secure a truly cylindrical surface; metal rolls are turned on a lathe, then ground and finally polished. Great care has also to be taken in setting the rolls in the frame and in adjusting them to each other. The method of applying the pressure is by using weights or by hydraulic presses, or by means of screws, the former being preferable where heavy pressures are required. See Beetling.

CALENDERS, The Three. Three one-eyed dervishes in *The Arabian Nights*. They are disguised as beggars, but turn out to be princes.

CAL'ENDS. See Kalends.

CALENTURA, kä'lĕn-tōō'rȧ (Sp., from Lat. *calere*, to glow, to be hot). A medical term formerly applied to a tropical fever with acute delirium, never fully described, but supposed to attack sailors in hot climates. The word was revived during the Spanish-American War, as applied to a prevalent fever in Cuba and the Philippine Islands; also called Cuban fever. It it said to begin without prodromal symptoms, a chill and a temperature of 103° F. ushering in the disease. The temperature is likely to rise higher; muscular pains supervene, with headache, loss of appetite, nausea, and marked weakness. Many cases recover spontaneously in a week. Calomel, followed by a saline cathartic, is given with success. Quinine is said to possess no efficacy.

CALEPINE, kăl'*e*-pēn, Sir. A knight in Spenser's *Faerie Queene*. The most notable of his feats is the slaying of a bear with his hands alone.

CALEPINO, kä'lā-pē'nō, Ambrogio (1435-1511). An Italian lexicographer. He was an Augustine monk, and devoted his entire life to the making of a polyglot dictionary. The first edition appeared in 1502; the Aldi published eighteen editions of it in a half-century (1542-92). That of 1590 comprises eleven languages, some of them added by Passerat and others. The word *Calepinus* came to mean 'a dictionary.'

CAL'GARY. A city in the Province of Alberta, Canada, and the centre of a large stock-raising region, on the Canadian Pacific Railroad, 2264 miles west of Montreal, and 838 miles west of Winnipeg (Map: Northwest Territories, G 4). It was incorporated in 1885, having been a Hudson Bay post prior to the construction of the railroad. It lies on a beautiful plateau nearly surrounded by Bow and Elbow rivers, and backed on three sides by lofty hills above which are seen the Rocky Mountains. It is an important distributing point for freight and the chief supply station for the mountain mining districts. It ships large quantities of cattle, sheep, and horses, and has a large trade in furs and hides. Its industries include the railway works of the Canadian Pacific Railroad, leather-making, soap-works, and brewing. The town is largely built of a light-gray stone. It contains churches, banks, good hotels, and schools, some costly public and private buildings, water-works, electric lights, and a good sewer system. It is one of the chief stations of the Northwest Mounted Police. The large Sarcee Indian Reserve lies to the southwest of the town. Population, in 1891, 3876; in 1901, 4866. Consult *Calgary Alberta* (Calgary, 1900).

CALHOUN, kăl-ho͞on′, John Caldwell (1782-1850). An American statesman, of Scotch-Irish descent, and Vice-President of the United States. He was the third son of Patrick and Martha (Caldwell) Calhoun, and was born in the Abbeville District (now county), South Carolina, March 18, 1782. Though early of a meditative disposition, he had, owing to the moderate circumstances of his family, little regular schooling, and he was 18 before he began the systematic study under his brother-in-law which fitted him in 1802 to enter the junior class at Yale. He graduated in 1804 with high honors, and then having studied law, partly in Charleston, he began to practice in Abbeville in 1807. He was soon sent to the State Legislature, and in 1811 was elected to Congress—the same year marrying a second cousin, Floride Calhoun, who had a moderate fortune. He sided with Clay and the war party in Congress, and on account of his strong personality came quickly to the front. He was distinctly nationalistic in his politics at this time, laying himself open to a charge of inconsistency when he later became a leader of the strict constructionists. In 1816 he was in favor of a national bank, advocated a strengthening of the navy for defense, and favored, as a means of binding together the widely spread Republic, not only internal improvements in the shape of permanent roads, but also a protective tariff. Calhoun became Secretary of War in Monroe's Cabinet in March, 1817, showing marked ability in the administration of a department then in the utmost disorder. He prepared, at the request of the House, a noteworthy report on roads and canals, and drew up one on Indian affairs which has received great praise. The army was reduced, and Calhoun's reorganization of it proved so satisfactory that his system was adhered to by his successors. In 1820 he favored the Missouri Compromise. He was now mentioned as a candidate for the Presidency, but General Jackson proved more popular, and Calhoun was elected Vice-President in 1824, with the support of the two principal parties. Turning to Jackson's side, in opposition to Adams, he was again elected in 1828. The passing of the 'Tariff of Abominations' of 1828, the protective features of which bore hard on the agricultural State of South Carolina, was the occasion of Calhoun's preparing a paper setting forth the claims of State sovereignty. This document was issued by the Legislature of his State, and is known as the "South Carolina Exposition." A definite break with Jackson followed the President's discovery that Calhoun had sought to call him to account for his course in the Seminole War. Then, when Jackson tried, with the aid of Martin Van Buren, to reinstate in Washington society the notorious Mrs. Eaton, Calhoun refused to coöperate with him, thus widening the breach. Jackson's hold on the people was so great that he could dictate his successor, and Calhoun's chances of becoming President were now gone. When Calhoun became convinced that the repeal of the protective tariff could not be secured through Jackson, he published, July 26, 1831, a manifesto, carrying on the argument of the "Exposition," repeating his arguments for free trade, and asserting the right of the States to nullify such Federal laws as they considered unconstitutional. South Carolina regarded the tariff modifications of 1830 as being a compromise in fact, but a reassertion of the principle of protection. On August 28, 1832, Calhoun wrote to Governor Hamilton, of South Carolina, giving the final statement of his doctrine, asserting that "there is no direct and immediate connection between the individual citizens of a State and the general Government," and that "the great conservative principle" of union is nullification. When the South Carolina convention, on November 24, 1832, passed an ordinance nullifying the tariff, Calhoun immediately resigned the Vice-Presidency and entered the Senate. By a compromise, engineered by Clay, a conflict was avoided; South Carolina won the particular point as to the tariff, but failed to secure the establishment of nullification as a principle. Acting with the Whigs, but still independent, Calhoun now became a scathing critic of Jackson's administration, though never allowing personal animus to appear; he condemned severely Jackson's removal of the public Government deposits from the United States National Bank, and his development of the spoils system. Foreseeing more clearly than any one else the conflict between the North and the South on the slavery question, he sought to avert it by checking all discussion of the issue. When, after the financial crisis of 1837, Van Buren proposed the "sub-treasury scheme," by which the United States avoids all connection with banks and controls its own deposits, Calhoun supported the President, much to the chagrin of the Whigs, with whom he had been acting. He was in favor of Van Buren's reëlection, and secured for him the vote of South Carolina. When Tyler, who became President on the death of Harrison, vetoed the bill for rechartering the United States Bank, Calhoun defended him; he denounced the tariff of 1842 and supported the Webster-Ashburton treaty. After having declined reëlection to the Senate in 1843, he was, in March of the next year, through a clever move on the part of Henry A. Wise, appointed Secretary of State by Tyler, and was chiefly instrumental in bringing about the annexation of Texas, in order to extend slave territory, thus practically necessitating a war, which he strove later to avert. In 1845 he was again in the Senate. In order to check the anti-slavery movement at the North, he proposed in 1847 a convention of Southern States, to prevent Northern commerce from entering their ports. Slavery he had come to advocate as a positive good. In 1849 he proposed a Southern convention, to set forth the grievances of the slavery side, looking toward "dissolving the partnership," if the only course left open seemed submission. His famous last speech in connection with the Compromise of 1850 was read, on account of his weakness, by another Senator. In this he asserted that an amendment to the Constitution would be necessary to restore equilibrium. He died March 31, 1850, having spent his last few months in writing his "Disquisition on Government," and his "Discourse on the Constitution and Government of the United States," probably the most remarkable discussions of the rights of minorities ever written.

Calhoun's personality was attractive and his morals were irreproachable. His power of logical analysis, though perverted, seems to entitle him to rank as our most original political theorist: he was probably too much of a doctrinaire to be held a statesman of the first order. It must be conceded, however, that throughout his long political career he impressed both friends and foes as only a man of extraordinary powers can do, and it is quite clear that he really believed that the only way to preserve the Union, which he dearly loved, was to reduce its strength almost to the vanishing point. Consult: *Life*, by Jenkins (1851), and by Von Holst (1882); Benton, *Thirty Years' View* (1854); *Calhoun's Collected Works* (6 vols., 1853-54); and his correspondence, edited by J. F. Jameson (1900).

CALHOUN, kăl-hōōn′, Simon Howard (1804-76). An American missionary. He was born in Boston; graduated from Williams College in 1829, and went as missionary to the Levant and later to Syria, where he labored with great success till his return in 1874. He was an authority on the Arabic and Turkish languages, and assisted in making the first translation of the Bible into Turkish.

CALÍ, kä-lē′. A city of Colombia, in the Department of Cauca (Map: Colombia, B 3). It is situated on the Calí, near its junction with the Rio Cauca, 3100 feet above sea-level, and contains the fine Ionic Church of San Francisco and a college. A noteworthy bridge crosses the Rio Calí at this point. The city is of considerable commercial and industrial importance, and is well equipped with business facilities: bank, telegraph, Government post-office, etc. Calí was founded in 1556. Population, about 12,000.

CAL′IBAN. (1) A deformed monster in Shakespeare's *Tempest*. He is the son of the witch Sycorax and a devil, and originally laid claim to the sovereignty of the enchanted isle. Prospero soon obtained complete mastery over his small mind, however, and has made a servant of him at the beginning of the play.

(2) A cynical philosophic drama by Ernest Renan (q.v.), published in 1878. It professes to take up the story of Caliban from where he is left in Shakespeare's *Tempest*.

(3) The *nom de plume* of Emile Bergerat.

CALIBAN UPON SET′EBOS, or Natural Theology on the Island. A characteristic psychological poem by Robert Browning. In it Shakespeare's amorphous creature, Caliban, discourses 'touching that other, whom his dam called God.' The text, "Thou thoughtest that I was altogether such a one as thyself," is a subtly ironical comment on the savage's words.

CALIBO, kä-lē′bō. A town of Panay, Philippines, in the Province of Capiz, situated on the northern coast of the island, 40 miles west of Capiz. Population, in 1898, 10,815.

CALIBRE (Fr., perhaps from Lat. abl. sing. *qua libra*, of what weight, measure). The calibre of a smooth-bore gun is the diameter of the bore. The calibre of a modern rifle of ordinary type is the diameter of a cylinder which will just touch the highest points of all the *lands* (the part of the surface of the bore between the grooves). In the case of rib-rifled guns, which have relatively very narrow lands, the calibre is the diameter of a cylinder which would just touch the bottom of all the grooves. The old smooth-bore cannon were designated by the weight of the shot they threw, as 24-pounder, 68-pounder, etc.; modern rifled cannon are described by the calibre, such as 10-inch, etc. The length of a piece is now designated by the number of calibres; for example, a 12-inch gun 40 calibres long is 40 feet in length, etc. See Artillery; Guns, Naval; Ordnance; Projectiles; and Small Arms.

CAL′IBURN. Another name of King Arthur's sword Excalibur.

CALICOBACK, or Calico-Bird. See Turnstone.

CALICO BASS (possibly so called because of its variegated color). A sunfish-like, mottled-olive bass (*Pomoxys sparoides*) of the whole Mississippi Valley and Great Lakes, highly prized as a food-fish and as game for youthful anglers. It reaches a length of 12 inches, weighing 2 pounds, haunts grassy streams and ponds, and bears transplanting well. It is a near relative of the crappie (q.v.), and is also known as grass-bass, strawberry-bass, and bar-fish. For illustration, see Plate of Fresh-Water Bass.

CALICO-BUSH. See Kalmia.

CALICO-PRINTING. See Textile Printing.

CAL′ICUT (Hind. *kolikodu, kolikotta*). A seaport of the Malabar District, British India, in latitude 11° 15′ N., and longitude 75° 50′ E., 566 miles south-southeast of Bombay, on the Indian Ocean and at the terminus of the southwest branch of the Madras Railway (Map: India, C 6). It was the first spot in India visited by Covilham (1486), and it was here that Vasco da Gama reached the shores of India in 1498, having come by the way of the Cape of Good Hope. Calicut was at that time prosperous and powerful. It twice repulsed the Portuguese, slaying their commander in 1509. It stands near the mouth of a small river of the same name, and possessed at one time a good haven. Now its anchorage is merely an open roadstead. Aside from this physical disadvantage, the ravages of war and the competition of superior localities contributed to the decay of Calicut. In 1792, when it fell into the hands of the English, the city was little better than a ruin, Hyder Ali, in 1765, having laid it waste to chastise European cupidity. Since then it has made considerable progress, and in 1891 had 66,100 inhabitants, which increased to 75,500 in 1901. From Calicut, *calico* derived its name, although the manufacture of that article has now declined. It has an important export trade in timber and spices.

CAL′IDA′RIUM (Lat., hot bath). See Bath.

CALID'IUS, Marcus (?-B.C. 47). A Roman orator and a contemporary of Cicero, whose recall from exile he advocated. He was prætor in B.C. 57 and after B.C. 49 was made Governor of Cisalpine Gaul, where he died. His oratory is praised by Cicero (*Brutus*, 75-80). For the fragments of his orations, consult Meyer, *Fragmenta Oratorum Romanorum*, 2d ed. (Zurich, 1842); also Quintilian (X. 1 and XII. 10).

CAL'IDORE. A knight representing courtesy in Spenser's *Faerie Queene*. He stands in the allegory for Sir Philip Sidney.

CALIF DE BAGDAD, kä'lēf' *de* bäg'dȧd', Le. See Boieldieu, F. A.

CAL'IFOR'NIA (a name applied in Spanish romance as early as 1520 to a fabulous island near the Indies, and "very near the Terrestrial Paradise"). A State on the Pacific Coast of the United States of America, ranking second in area (not reckoning the Territory of Alaska), twenty-first in population, and eighteenth in order of admission, and popularly known as the "Golden State," or in the West simply as the Coast (Map: United States, Western Part, B 3). The State is bounded on the north by Oregon, on the east by Nevada and a small portion of Arizona, on the south by Lower California (Mexico), and on the west by the Pacific Ocean. It stretches along the coast from latitude 32° 40' N. to latitude 42°, a distance, measured along the centre of the State, of 750 miles, and its eastern boundary conforms to the curve of the seacoast, so that its breadth is approximately the same throughout, averaging about 200 miles. The meridian of 120° W. longitude marks the eastern boundary of the northern third of the State, and bisects the eastward-trending southern part, dividing the whole into two nearly equal parts. The total land area is 155,980 square miles.

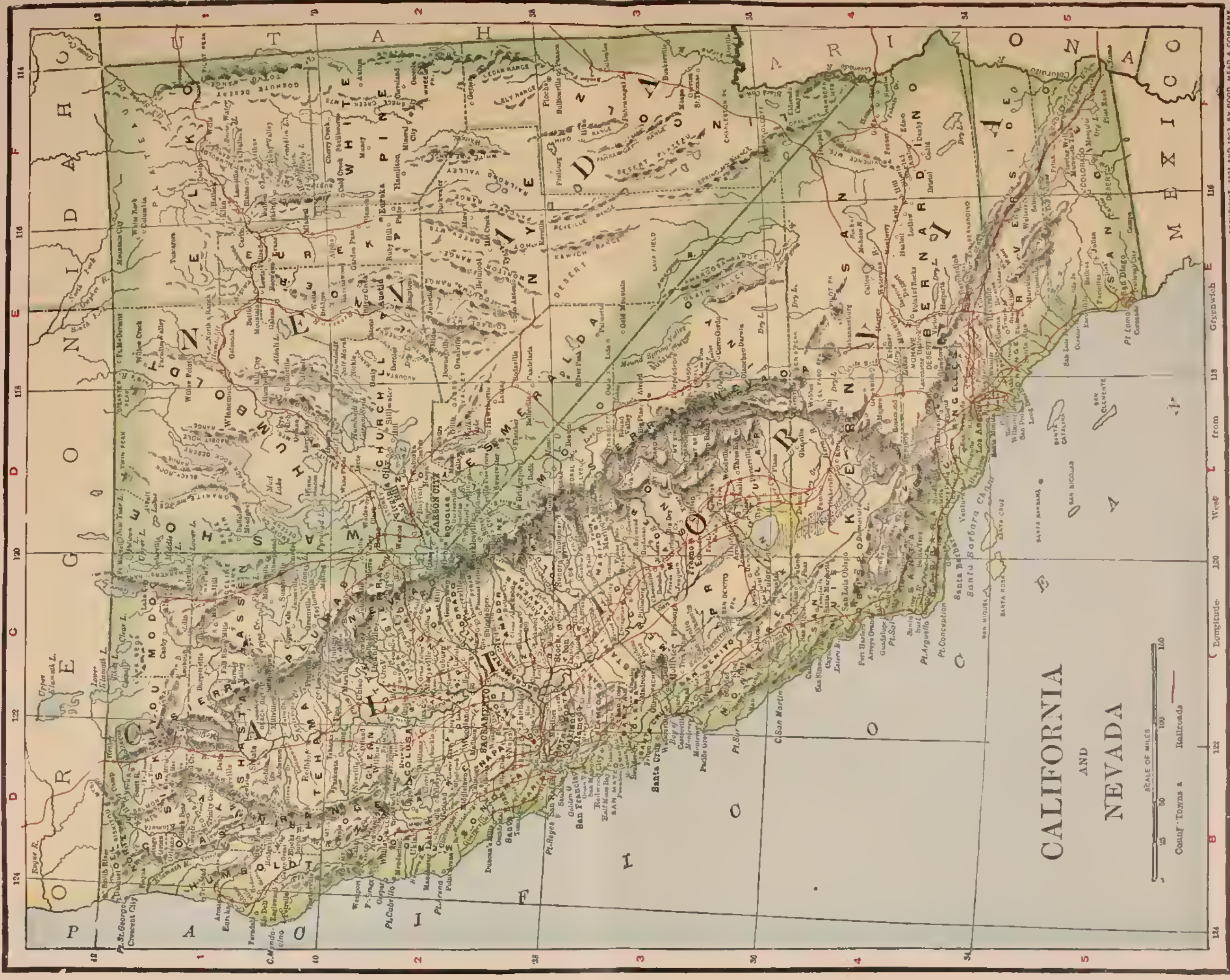
Topography. The physiography of this immense State is strikingly varied, but, broadly stated, consists of two parallel mountain systems, extending northwest and southeast, inclosing between them a very extensive valley, in addition to which is included in the northeast a part of the Great Basin, and in the southeast a part of the Colorado Plateau. Of the two mountain systems, the longer is that known collectively as the Coast Range, being a part of the uplift which defines the continental west coast from the extremity of Lower California to the edge of Oregon, and which reappears in the Olympic range of Washington and the islands of British Columbia, and southern Alaska. Within the limits of California, beginning at the south, it is made up of the San Jacinto, Santa Ana, San Bernardino, and San Gabriel ranges, then of the San Rafael and Santa Lucia mountains along the lofty coast between Los Angeles and Santa Cruz. Interior to these is a second lesser range, called by the Mexican settlers Sierra Madre, which becomes more prominent northward, is broken by the Bay of San Francisco and outlet-valley of the Sacramento River, and extends thence to the border of Oregon, where the watershed bends eastward and forms the very lofty Shasta and Salmon River ranges; but Shasta belongs orographically to the Cascade system of Oregon. Notable altitudes in this system are as follows: San Bernardino Mountain, 11,600 feet; San Jacinto Mountain, 10,987 feet; San Gabriel Peak, 6152 feet; Tehachapi Peak, 9214 feet; Mount Pinos, 9214 feet, Mount Diablo, 2849 feet; Thunder Mountain, 9125 feet; Eddy Mountain, 9161 feet; Scott Mountain, 7850 feet; China Mountain, 8000 feet; Siskiyou Peak, 7662 feet. The altitude of Mount Shasta, a volcanic mass, is 14,380 feet, and its group contains several other peaks approaching 10,000 feet in height.

East of the Coast Ranges, and parallel with them, lies the Sierra Nevada ('Snowy Range'), at a distance of 100 to 140 miles, stretching from the 36th parallel northwestward nearly to the 41st, where it ends at the valley of Pitt River, which separates it from the Shasta Range. This system, one of the grandest on the continent, consists of a massive uplift of ancient stratified rocks, which have been worn into an area of clustered peaks, averaging 50 miles wide and over 400 miles long. The eastern side is abrupt and rises from the plateau of Nevada, but the western slope, receiving nearly all the rainfall and delivering all the drainage, has been worn into a series of tremendous cañons, of which those of the Merced (Yosemite), Kings, Tuolumne, and American rivers are far-famed. The Sierra Nevada is characterized by its extreme ruggedness, the sharp, precipitous, deeply sculptured profile of its peaks and gorges, and by the great average altitude of its central mass, as well as by the prevalence of many peaks, which not only reach into the zone of perpetual snow, but bear remnants of the vast glaciers which, until comparatively recent times, covered the crests of the whole range and took so large a part in its erosion. The principal peaks and their measurements, from south to north, are as follows, beginning with the highest mountain in the United States proper: Mount Whitney, 14,898 feet; Kaweah Peak, 14,000 feet; Mount Brewer, 13,886 feet; Mount Lyell, 13,042 feet; Merced Peak, 11,413 feet; Gray Peak, 11,174 feet; Dunderberg, 13,320 feet; Twin Peak, 8924 feet; Matterhorn, 12,175 feet; Tower Peak, 11,704 feet; Leavitt's Peak, 11,553 feet; Senora Mountain, 11,478 feet; Stanislaus Peak, 11,209 feet; Pyramid Peak, 10,052 feet. The fact that the southern end of the range is loftier than the northern may indicate the greater work of erosion at the north, due to the greater rainfall there. From Sierra County there runs straight northward along the Nevada boundary a line of elevations of igneous origin, called the Warner Range, containing many high peaks. West of this line of peaks a plateau formed by a lava overflow and averaging 5000 feet above the sea, stretches to the Shasta and Siskiyou mountains and northward into the Klamath region of Oregon.

Between these two mountain systems, the Coast ranges and the Sierra Nevada, lies the great valley of California, broadly open for some 400 miles from where the Kern River Mountains connect the Sierra Nevada with the Coast Range at Tehachapi, to where Shasta closes it in the far north. This valley is divisible into three parts. The first is the basin of the Sacramento River, north of San Francisco Bay, into which the river empties. This stream begins as the Pitt River, which flows out of Goose Lake, in the northern part of the State, forces its way through the gorges that separate the Sierra Nevada from the Shasta Range, and after receiving the McCloud from Mount Shasta, turns southward as the Sacramento River. It is fed by many streams

AREA AND POPULATION OF CALIFORNIA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Alameda	C 3	Oakland	764	93,864	130,197
Alpine	D 2	Markleeville	710	667	509
Amador	C 2	Jackson	632	10.320	11,116
Batte	C 2	Oroville	1,660	17.939	17,117
Calaveras	C 2	San Andreas	1,080	8,882	11,200
Colusa	B 2	Colusa	1,088	14,640	7,364
Contra Costa	B 3	Martinez	728	13,515	18,046
Del Norte	B 1	Crescent City	992	2,592	2,408
Eldorado	C 2	Placerville	1,796	9,232	8,986
Fresno	C 3	Fresno	6,152	32,026	37,862
Glenn	B 2	Willow	1,270	......	5.150
Humboldt	B 1	Eureka	3,496	23,469	27,104
Inyo	E 3	Independence	10.294	3,544	4,377
Kern	D 4	Bakersfield	8,050	9,808	16,480
Kings	D 3	Hanford	984	......	9,871
Lake	B 2	Lakeport	1,328	7,101	6,017
Lassen	C 1	Susanville	4,520	4.239	4,511
Los Angeles	D 4	Los Angeles	4,202	101,454	170,298
Madera	D 3	Madera	2,062	......	6,364
Marin	B 2	San Rafael	549	13,072	15,702
Mariposa	C 3	Mariposa	1,510	3,787	4,720
Mendocino	B 2	Ukiah	3.626	17,612	20,465
Merced	C 3	Merced	1,932	8,085	9,215
Modoc	C 1	Alturas	3.741	4,986	5,076
Mono	D 3	Bridgeport	3,020	2,002	2,167
Monterey	C 3	Salinas	3,340	18,637	19,380
Napa	B 2	Napa	780	16,411	16,451
Nevada	C 2	Nevada City	972	17,369	17,789
Orange	D 5	Santa Ana	750	13,589	19,696
Placer	C 2	Auburn	1,365	15,101	15,786
Plamas	C 1	Quincy	2,694	4,933	4,657
Riverside	E 5	Riverside	7,323	......	17,897
Sacramento	B 2	Sacramento	1,000	40,339	45,915
San Benito	C 3	Hollister	1,388	6,412	6,633
San Bernardino	E 4	San Bernardino	19,947	25,497	27,929
San Diego	F 5	San Diego	8,478	34,987	35,090
San Francisco	B 3	San Francisco	47	298,997	342,782
San Joaquin	C 3	Stockton	1,396	28,629	35,452
San Luis Obispo	C 4	San Luis Obispo	3,310	16,072	16,637
San Mateo	B 3	Redwood City	434	10,087	12,094
Santa Barbara	C 4	Santa Barbara	2,632	15,754	18,934
Santa Clara	C 3	San José	1,286	48,005	60,216
Santa Cruz	B 3	Santa Cruz	424	19,270	21,512
Shasta	B 1	Redding	3,876	12,133	17,318
Sierra	C 1	Downieville	960	5,051	4,017
Siskiyou	B 1	Yreka	5,991	12,163	16,962
Solano	C 2	Fairfield	900	20.946	24,143
Sonoma	B 2	Santa Rosa	1.620	32,721	38,480
Stanislaus	C 3	Modesto	1,456	10,040	9,550
Sutter	C 2	Yuba City	622	5.469	5,886
Tehama	B 1	Redbluff	3,008	9,916	10,996
Trinity	B 1	Weaverville	3,282	3,719	4,383
Tulare	D 3	Visalia	1,952	24,574	18,375
Tuolumne	C 2	Sonora	2,208	6,082	11,166
Ventura	D 4	Ventura	1,721	10,071	14,367
Yolo	C 2	Woodland	996	12,684	13,618
Yuba	C 2	Marysville	636	9,636	8,620



CALIFORNIA AND NEVADA

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AREA AND POPULATION OF NEVADA BY COUNTIES.

County.	Map Index.	County Seat.	Area in square miles.	Population.	
				1890.	1900.
Churchill	D 2	Stillwater	4,816	703	830
Douglas	D 2	Genoa	878	1,551	1,534
Elko	F 1	Elko	16,939	4,794	5,688
Esmeralda	D 2	Hawthorne	8,776	2,148	1,972
Eureka	F 7	Eureka	4,111	3,275	1,954
Humboldt	D 1	Winnemucca	16,126	3,434	4,463
Lander	E 2	Austin	5,307	2,266	1,534
Lincoln	F 3	Pioche	19,137	2,466	3,284
Lyon	D 2	Dayton	1,267	1,987	2,268
Nye	F 2	Belmont	17,376	1,290	1,140
Ormsby	D 2	Carson City	120	4,883	2,893
Storey	D 2	Virginia City	263	8,806	3,673
Washoe	D 1	Reno	5,612	6,437	9,141
White Pine	F 2	Ely	8,712	1,721	1,961

from the mountains on each side, of which the Indian, Feather, and American are largest, and in its lower course traverses a marshy flood-plain, annually overflowed. South of where the river turns into the sea and expands into Suisun and San Pablo bays, the valley is occupied by another large river, the San Joaquin, which gathers the waters from all the southern mountains, through its own sources in the heights of Fresno County, and by means of the Merced, the La Grange, Stanislaus, Calaveras, Consumnes and many lesser streams, which periodically pour floods down the valley to flood many square miles of reedy marshes, among which the San Joaquin joins the Sacramento. South of the head of the San Joaquin Valley, and separated from it at Fresno by a low divide, begins a somewhat circular, dry, and fairly level plain, about 100 miles long by 80 broad, the western part of which is a low, alkaline desert, surrounding Tulare Lake—an expanse of marsh-girt waters, 25 miles broad. Into this basin pours Kings River, and toward it flow many other mountain streams, which mostly disappear in the sand. In the southern part of this valley-plain the Kern River flows southwestward through a region some 500 feet above sea-level, and empties into Buena Vista Lake. South and east of the mountains the country becomes a hot and waterless waste, named Mohave and Colorado deserts, sloping gradually to the Rio Colorado and the Gulf of California. In the northern half this waste is broken by ranges and groups of arid, volcanic hills, among which lie deep salt-covered valleys, the most forbidding of which is Death Valley (q.v.), an alkaline, lava-strewn depression near the Nevada boundary and just north of the 36th parallel. The valley is from 200 to 350 feet below sea-level. On the seaward side of the Sierra Madre, however, is an extensive region, narrowing northward to Santa Barbara, comprising the most populous and useful part of Southern California—the districts about San Diego, Los Angeles, Riverside, Ventura, and Santa Barbara. Similar coast districts are repeated northward in Monterey and Santa Clara counties, and north of San Francisco Bay, in Sonoma and Mendocino counties, west of the Coast Range. Some important rivers descend to the sea in these coastal spaces, such as Russian River, in Sonoma County; Eel River, in Mendocino and Humboldt counties; and Trinity River, in Trinity County, all of which have a northwest course. Flowing irregularly southwest across the northwest corner of the State, is the Klamath River, which drains the Siskiyou, Salmon, and other coast ranges of that region.

The coast south of Santa Barbara is low and sandy, with several large islands in the offing. But north of Santa Barbara it is high and rocky, bold cliffs facing the sea, almost unbroken by harbors, other than that of the Bay of San Francisco, entered through the rift in the coast, cut by the joint outflowing of the Sacramento and San Joaquin rivers, and called the Golden Gate.

CLIMATE. No State of the United States, indeed, few of the most favored countries of the world, can boast of so delightful a climate as that of the valley lands of California. Two seasons, the wet and the dry, divide the year; the first so called because it is the only period during which it rains, though rains are not continuous, and the average fall for the State, twenty-three inches, is less than at Chicago or Saint Louis. This season lasts from about the middle of November till April or May.

At San Francisco snow is almost unknown, the mercury never remains below the freezing point for twenty-four hours, and flowers bloom in the gardens at Christmas time. The average mean temperature at San Francisco is 51°—summer, 60°; winter, 49°. Trade winds from the southwest prevail along the coast and give the valleys opening toward San Francisco Bay a climate peculiarly their own. Owing to the cool summer climate of the coast between parallels 35 and 40, San Francisco in July is cooler than San Diego by 7°, and than New York by 17°, and does not attain its highest temperature until the trade winds cease in September.

In the central valleys greater extremes of temperature are experienced than along the coast. The mean temperature for this belt is 64°, and is remarkably uniform. In the north the summer is warmer and the winter cooler than in the south. The rainfall decreases gradually from north to south, being 51 inches at Cape Mendocino and 46.6 inches at Redding, in the interior, on the same parallel as Cape Mendocino, 23 inches at San Francisco and 4 inches at Bakersfield. In southern California the climate may be said to reach perfection. At San Diego the mean winter temperature is 54°, summer, 68°, and at Santa Barbara, 53° and 68° respectively. At Monterey the difference between the average temperature of January and July, is 6°; at Los Angeles, 12°. San Diego is 6° or 7° cooler than Charleston or Vicksburg, which are nearly in the same latitude. The great heat of the interior and of the southwest, where, as at Fort Yuma, the average summer temperature is 92°, is due to the dryness, which is easily borne, and sunstrokes never occur. Thunder-storms are common in California. Everywhere the nights are cool, or at least endurable; the clearness of the atmosphere causing rapid radiation. Early spring, comprising the latter part of February and the month of March, is the most delightful part of the year. The air is mild, the sky clear, and the landscape gay with flowers. Summers are dry except along the coast from six to ten miles inland, where fogs are likely to occur. During the summer the earth becomes dried to a depth of several inches; the air is filled with dust, the vegetation is burned brown, and the smaller streams disappear, a state of things that lasts until the autumn rains begin. Among prominent winter resorts are San Diego, noted for its fine harbor, on one side of which is the famous Coronado Beach; Santa Barbara, overlooking the Pacific, a favorite watering-place; Santa Monica, noted for surf-bathing throughout the year; Santa Cruz, with a fine beach and background of mountains; Monterey, on beautiful Monterey Bay, associated with the earlier history of the province under Spanish rule; Indio, over 100 feet below sea-level, is remarkable for cures effected by its air in pulmonary diseases; Los Angeles and adjoining places, including Pasadena, in a section that has been termed 'the Italy' of the United States—a paradise of rose-gardens, vineyards, and lemon and orange groves. Other resorts are the Arrowhead Hot Springs, El Paso de Roble, and Napa Soda Springs.

FLORA. As California presents almost every variation of climate known on earth, ranging from that of the tropics to that of the Arctic regions on its high mountains, and from a copious rainfall to the aridity of the desert, it naturally presents a very wide variation in its flora. The influence of climate upon flora is nowhere more strongly marked than in this State. The tree flora of California, as of the entire western part of the country, is characterized by consisting almost entirely of coniferæ, while broad-leafed trees are very few in number, consisting of oaks, madroña, and a few other species very limited in number and distribution. The trees of all species are of great size. For illustration, see Sequoia.

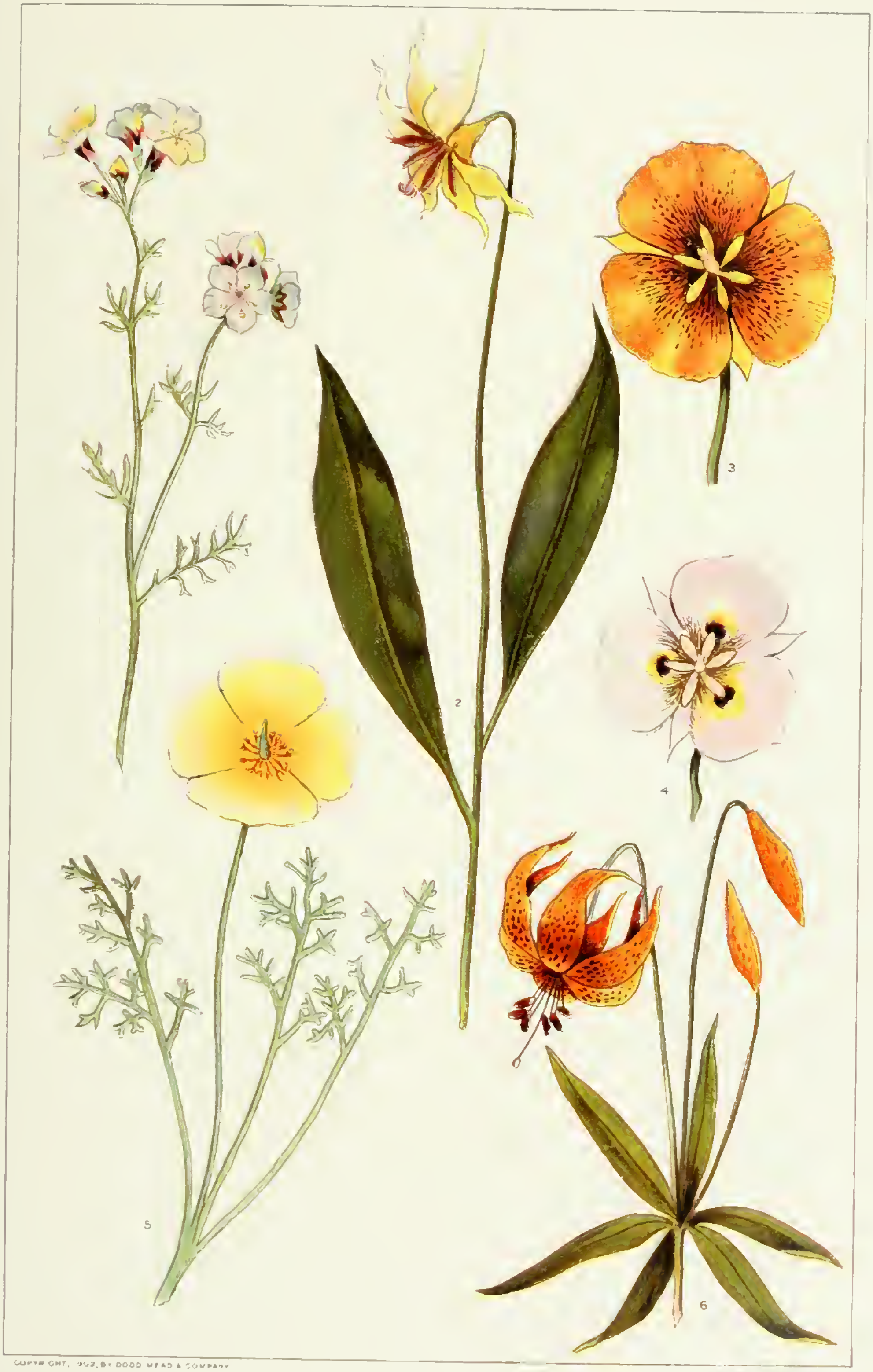
Stretching along the Coast ranges from the Oregon line southward nearly to the Bay of San Francisco, and in scattered groves even as far as Santa Cruz, is found the redwood, whose enormous trees form an extremely dense forest, extending to the lower part of Mendocino County. This forest occupies the foggy, wet stretch of land closely bordering the coast. East of this, in the northern Coast ranges, is a mixed forest consisting of red fir and yellow and sugar pines. The coast ranges south of these forests are almost treeless, but are covered with grasses, and often with a variety of thorny bushes, catsclaw, manzanita, scrub oak, etc., which collectively are known as chaparral. Here and there among them are scattered oaks and digger pines. The ranges of southern California, which rise to greater altitudes, are, on their lower slopes, covered with chaparral, while above 5000 feet are open forests of yellow pine, with scattered specimens of sugar and Coulter pine among them. The valleys of southern California contain some chaparral, with a little grass and many cacti and Spanish bayonet, being the vegetation which is peculiar to an arid region.

The great valley of California is, in its northern part, covered with a scattering growth of oaks, while the southern part is devoid of timber of any sort, and is more or less under cultivation. The marshes on the lower courses of the Sacramento are covered with tule reeds. The Sierra Nevada is, on its lower slopes, covered with a thick growth of chaparral, with a few oaks and digger pines, while above an altitude ranging from 3000 feet in the southern part to 1500 feet in the north begins the yellow-pine belt, which is composed mainly of trees of that species, with sugar-pine, incense-cedar, and red fir intermingled. This occupies a strip on the west slope of the range, extending up to an altitude of 8000 or 9000 feet, above which it is succeeded to the timber-line, which ranges from 9000 to 10,000 feet, by trees of more Arctic character—firs, hemlock, and, finally, at the timber-line, by white-barked pine. On the east side of the range the succession is somewhat similar, but the belts are much narrower, owing to the abruptness of the range on this side. The plateau east of the range is a desert, with very little vegetation, and that of low shrubby growth. In the yellow-pine belt, upon the west slope of the Sierra, there occur ten groves of Sequoia Gigantea, the largest and oldest tree on earth, ranging in size up to 33 or 34 feet in diameter, with heights of from 300 to 350 feet. These do not occur in pure growth, but scattered among the yellow pines. Most of the groves are within national forest reserves or national parks, but much of the land, unfortunately, is held in private hands, and the trees are being cut for lumber.

Fauna. As California extends north and south through nine degrees of latitude, and ranges from arid deserts in the south to humid and forested mountains in the north, and from the lofty Sierras on the east to the sea, it must not only embrace a large variety of animal life, but include several distinct faunas adapted to its varied climates and terrenes, such as those of the coastal valleys and plains; of successive zones of altitude in the mountains; of the sandy southern semi-tropical deserts, etc. Few of its animals are of the same species as those found in the eastern half of the United States. The representatives are all of distinct surface races; but California is closely allied, zoölogically, to the interior basin and Rocky Mountain region. Among the characteristic mammals of the State are the grizzly and black bears; wolves, large and small, and several fur-bearers; puma and lynx; varieties of the white-tailed and black-tailed deer, and in the extreme north the Columbian blacktail. The bison never entered the State; the wapiti did so formerly, but is no longer to be found there. The bighorn wanders in the high Sierra, where also are found the peculiar little beaver-like sewellel, and various picas. Several rodents, such as the golden and Douglas squirrels, are peculiar to these parts of the mountains, while the plains abound in burrowing rodents, among which are large hares that have increased since civilization reduced their enemies, until in the central and southerly parts of the State they have become a decided pest. The coast fauna comprises several representatives of the seal family. The birds of California include many species not known elsewhere. A species of vulture, the California condor, was the most remarkable, but is extinct save in Lower California. The two crested quails of the State are familiar to sportsmen, as also is the large local ground-cuckoo, called road-runner. Another remarkable local bird is the California woodpecker, peculiar in storing great quantities of acorns in holes in the bark of trees for winter consumption. The islands off the coast, especially the Farallones, are well supplied with sea-birds. Among reptiles, two or three species of rattlesnakes are exceedingly numerous in the lower parts of the mountains, and all over the southern region, where also a great variety of lizards exists. The fishes of both the sea and fresh waters are numerous and valuable. Peculiar classes of sea-fish are the rose-fish, smelts, surf-fish, herrings, rock-trout, and various important food-fishes of the cod family. The rivers of the north receive annually vast 'runs' of salmon, which are different from the Eastern salmon (see Salmon). Few of these fishes are the same as Atlantic species, but many belong to groups well represented elsewhere. The care and protection of game animals and fish-culture have received much attention.

Geology. A large part of the area is underlain by sedimentary strata of a comparatively recent geological age. Triassic and Jurassic beds predominate in the northern and west-central parts, and Cretaceous and Tertiary beds in the coastal region. Along the Sierra Nevada and Coast ranges volcanic rocks are strongly developed and cover wide areas. The central axes of these two great ranges are formed, however, by ancient igneous and metamorphic rocks which may belong to the Archæan formation. Granite is especially

CALIFORNIA FLORA



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[illegible]

1 GILIA - GILIA TRICOLOR
2 WESTERN DOG'S-TOOTH VIOLET - ERYTHRONIUM GRANDIFLORUM
3 CALOCHORTUS LUTEUS
4 BUTTERFLY TULIP - CALOCHORTUS VENUSTUS
5 CALIFORNIA POPPY - ESCHSCHOLTZIA CALIFORNICA
6 CALIFORNIA LILY - LILIUM PARDALINUM

prominent in these localities and constitutes some of the highest peaks. The elevation of the Coast Range took place at the close of the Miocene period, while the Sierras were formed largely by an uplift that occurred near the end of the Jurassic period. Carboniferous strata occupy a large area in the central part of the State, but they inclose no coal-seams of economic importance.

Mining. California is rich in mineral deposits, particularly gold, which is found in over thirty counties, and the rapid settlement and development of the State were due to this fact. Gold was obtained by washing as early as 1841, near San Fernando mission; but it was the discovery at Sutter's Mill, near Coloma, in 1848, that made evident the abundance of the metal and attracted the excited throngs of adventurers. Many of these engaged in river mining—i.e. washing in sheet-iron pans or wooden ‘rockers’ the gold from the sands or gravels from or near river channels; others dug the gold ‘dry’ from veins in the rocks. About 1851 sluices were introduced, by means of which the gravels or sands were run over the bottom of a wooden box provided with blocks of wood or round stones to catch the gold as it sank. Digging soon extended from the rivers and the gulches to the higher ground, where the difficulty of washing was increased; but in 1852 the hydraulic system was brought in. In this, continuous powerful streams of water are directed through nozzles upon a gold-bearing bank or deposit. This was so successful that whole hills were reduced and swept away, but this practice was soon forbidden by law, as the detritus threatened to choke the rivers and seriously damage the agricultural interests in the valleys below. Nearly all the mines are on the western slope and in the foothills of the Sierra Nevada in a belt of country about 220 miles long by 40 wide, extending into Oregon. The gold is found in a metallic condition, but is usually mixed with silver or other metals. In stream or alluvial deposits (‘placers’) it occurs as fine scales or coarse grains. In rocks, it is found in quartz veins, and costly machinery must be used to crush the ore, from which the gold is extracted by amalgamation with quicksilver. Where, as often is the case, the gold-bearing gravels underlie volcanic rock several hundred feet thick, drift or tunnel mining combined with sluicing is necessary. The chief gravel-mining region extends from Mariposa County into Plumas County, or between parallels 37° and 41°, and includes some quartz veins. Most of the gold is now obtained from the quartz mines, especially in Calaveras, Kern, Trinity, El Dorado, Nevada, and Sierra counties. Gold-mining is to-day greatly facilitated by the application of electrical power, which the mountain streams are made to generate. The great prominence and significance of gold in the early years of the State are evident from the great size of the output, the annual average for the decade between 1850 and 1859 inclusive being estimated at over $55,000,000, and constituting nearly the entire product of the United States. Following this period there was a constant decline in the output, which reached the minimum ($12,000,000) in 1892; it then revived, and for the last half-decade of the century averaged over $15,000,000 annually. The State continued to hold first place until 1897, when it was surpassed by Colorado. The total output of the State to the end of 1900 was about $1,350,000,000. While rich silver ores are found, there are no mines which produce silver exclusively. The $700,000 of silver mined in 1900, an increase over former years, was a by-product from gold, lead, or copper mining. Copper-mining has recently made rapid progress, and the State ranks fourth in the production of copper ore, the yield having increased from 6300 tons in 1897 to 13,200 tons in 1900. This ore, which is found principally in Shasta County, is partly shipped out of the State for smelting.

The State produces almost the whole of the quicksilver output of the United States, its mines rivaling those of Spain in productiveness. From 1875 to 1882 the output averaged 64,000 flasks annually, but since that period the annual average has been only 30,000 flasks; the value of the product ranged from $1,000,000 to $1,500,000. Fifty per cent. of the product is secured from Santa Clara County. The fuel products of the State include petroleum, bituminous coal, and natural gas, of which the first is the most important. The oil is found in the southern coast region, particularly Los Angeles, Kern, Santa Barbara, and Ventura counties. It is refined to some extent, but its most important use is as a fuel. Its production is steadily increasing, the output having grown from 300,000 barrels in 1890 to 4,250,000 barrels in 1900. Bituminous coal is mined in Monte Diablo and the neighboring hills. For several years the output fluctuated around $200,000 in value, but for a few years now the annual output has doubled that amount. Natural gas is found in the Sacramento and San Joaquin valleys. The State ranks second in the production of mineral water, the product for 1899 having been estimated at $698,000. Salt is obtained by the evaporation of sea-water. Building-stone is abundant, and includes hydraulic limestone, rhyolite, bluish and light-brown sandstones from San Francisco Bay, and from San José a light-brown variety, which is almost pure silica, cuts easily, and stands fire well. San Bernardino County yields marbles of many shades; El Dorado County, fine white marble, streaked with blue; and in Inyo County some of the foothills are composed of white marble equal to Italian. Freestone, buhrstone, granite, and basalt suitable for pavements and buildings are also found in abundance, while the granite output averaged in value about $1,000,000 annually during the last decade of the century. Brick clays occur in some localities. Asphalt is obtained in varying quantities and constitutes the greater part of the output of the United States, the largest annual product, that for 1898, exceeding $600,000 in value.

Fisheries. California rivals Oregon in the extent of her salmon fisheries, the annual exports of salmon alone exceeding $2,000,000 in value. The supply of this and other varieties of fish has been increased through the activity of the State Government in enforcing protective laws and establishing hatcheries. The annual exports of shell-fish fall a little under $200,000 in value. The total value of the exports of fish from San Francisco during 1895-97 exceeded $2,500,000. There is a large local consumption of salt fish—flounder, sole, and tomcod—the supply of which is secured by drag-net fishing along the mud banks extending from Point Reyes south to Monterey. The State ranks next to Massachusetts in whale-fishing.

AGRICULTURE. California has no equal among the States, and, indeed, scarcely among the countries of the world, in natural agricultural possibilities. In no other part of the world is so great a variety of crops brought to so high a stage of development. Over the greater portion of the agricultural area the crops of both the temperate and the sub-tropical zones can be grown at will, with equal success. Since 1850 the agricultural section of the population has increased more rapidly than any other. During the decade 1890-1900, the number of owners and tenants increased much more rapidly than did the total rural population, being contrary to the tendency shown in the two decades preceding. This is indicative of the movement now in process by which the large estates, under the influence of increased irrigation and intensive cultivation, are passing into the hands of smaller landowners. These large estates were partly the result of easy acquisition of land and partly of confirmation by the United States Government of Mexican land grants to private individuals. The holders of these estates were at first opposed to subdividing them, and only recently have settlers been able to obtain desirable farms on them. Still the average size of the farms in 1900—397.4 acres—was quite large, and there were 4753 farms which contained 1000 acres and over, constituting 62.8 per cent. of the total farm acreage. The income per acre from the farms is in inverse ratio to their total area; the farms under three acres in size having an average income of $253.89 per acre, while the farms of 1000 acres and over averaged but $2.02 per acre. The smaller farms are devoted to city dairying, and to floriculture, and to the more valuable and intensively cultivated crops, while the larger are generally unirrigated stock or grain farms.

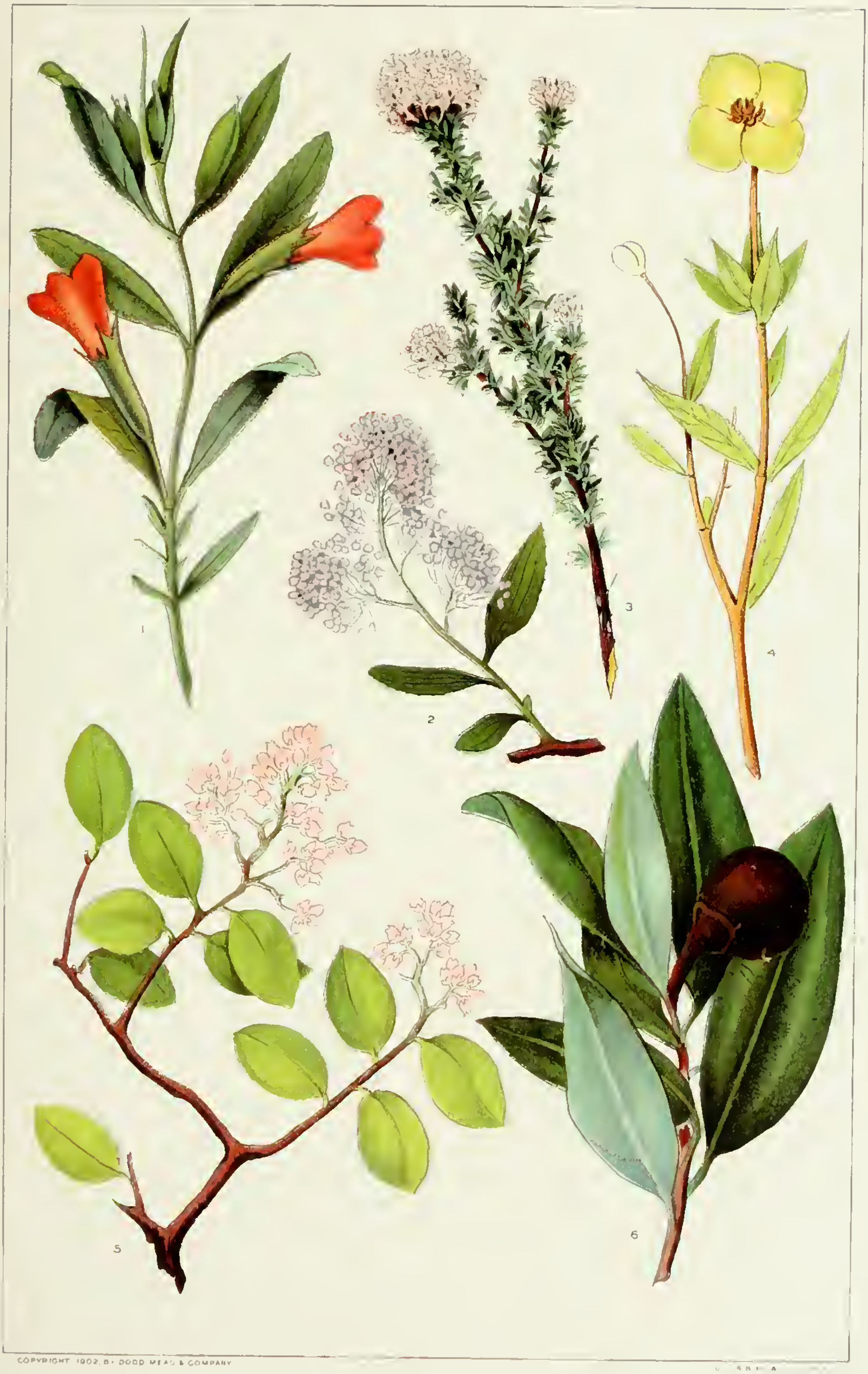
The earlier agricultural period was characterized by the great predominance of wheat-raising. Many of the large holdings were almost exclusively devoted to this industry, giving rise to the large ranch or bonanza farms of world-wide fame. Thus the production of wheat became enormous, at one time exceeding that of any other State. This was accomplished for the most part without irrigation. The Defiance and the White Australian varieties were grown for milling, and Sonora wheat for shipping, the dryness of the atmosphere resulting in a superior quality of grain which was in special demand in the London markets. The maximum acreage under wheat (2,875,000) was reached in 1893, since when the State has lost in relative importance as a wheat-producing State. The central valley is the great wheat district of the State. Owing to the level formation of the surface and the freedom from any kind of obstruction, the most expensive and complicated farm machinery invented is more extensively used here than anywhere else in the world. The same machine plows the ground, prepares the soil, and sows the seed, and probably two-thirds of the crop is gathered with a combined reaper and thresher. Steam power is largely used. Barley is the only other cereal which is extensively grown, and the only crop which has been rotated with wheat. The conditions are very favorable to its growth, and there is a tendency to substitute it for corn as a stock-food. About 1,000,000 acres are devoted to its cultivation—or nearly one-third of the total acreage under that crop in the United States. Both wheat and barley are extensively used for hay, being cut down while green. Corn matures later and requires irrigation, and inasmuch as the irrigated land is more profitable when devoted to the more valuable crops, and barley can be substituted for corn, but little of the latter is cultivated. Oats likewise is little grown except for use as hay. The total, in 1900, for all grains cut green for use as forage was 1,506,000 acres, or considerably more than twice the amount of all other hay and forage crops. The acreage for hay and forage crops was 56.4 greater in 1900 than in 1890. The abundance of alfalfa and other food-plants of the bee has encouraged the keeping of bees, and honey is a considerable product.

The native grasses, oats, and clover dry without cutting, but constant pasturage has almost exterminated them, and alfalfa in moist regions, and Texas mesquit grass on dry hills and plains, are taking their place. Alfalfa yields three to four crops a season. The cultivation of hops is rapidly becoming an important industry.

IRRIGATION. The aridity of the climate of California is not so extreme as is generally supposed, nor is it without its advantages. In most parts the rainfall of the spring months is sufficient for the development of the early-maturing crops, while the numerous mountain streams supply a source of irrigation for the production of the more valuable or the later-maturing crops. In nearly every county some farming is done without the aid of irrigation. The irrigated area, however, is being constantly and rapidly extended, and is exceeded only by that in Colorado, although the value per acre of the products of the irrigated land is much greater than that of Colorado or any other State. In 1900 the advantages of irrigation were afforded to 35.4 per cent. of the total number of farms, and to 12.1 per cent. of the total improved acreage, or 1,446,000 acres of land. The irrigated farms averaged only 57 acres in area. The average cost, per acre irrigated, of the construction of works for irrigation was $10.30 for the State, but in certain districts, and particularly in the southern counties, the cost is much higher, reaching $42.57 in San Diego County. There are 152,500 acres irrigated from wells and tunnels, but the greater portion receives its supply from streams and other surface sources.

As a result of the growing irrigation facilities, the horticultural products are becoming especially prominent. Many varieties of horticultural plants, difficult or impossible to raise in other States, and for a supply of which the country was formerly dependent upon imports from abroad, are now produced with great success in California. This is especially true of the regions where the rainfall is lightest, and the necessity and consequent advantages of irrigation are greatest—i.e. on the southern Pacific coast and in the valley of the San Joaquin. But more recently the development of fruit-growing in the Sacramento Valley has made irrigation prominent in that region, the application of the system being greatly facilitated by the utilization of abandoned ditches, originally used as water-conduits in connection with hydraulic mining. In the central and northern coast regions the natural rainfall, unaided by irrigation,

CALIFORNIA SHRUBS



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1 CALIFORNIA SHRUBBY MONKEY-FLOWER - MIMULUS GLUTINOSUS
2 CALIFORNIA LILAC CEANOTHUS THYRSIFLORUS
3 CHAMISO - ADENOSTOMA FASCICULATUM
4 SHRUBBY POPPY - DENDROMECON RIGIDUM
5 MANZANITA - ARCTOSTAPHYLOS MANZANITA
6 CALIFORNIA LAUREL UMBELLULARIA CALIFORNICA

is adequate even for fruit-culture. The cultivation of fruit and the preparation of it for the market now give employment to more people than any other industry. Of the great variety of horticultural plants grown in the State, the most notable are the vine, the citrus fruits, oranges and lemons, and the prune, the latter being more extensively cultivated than any other orchard fruit in the State.

Viticulture was early introduced by the Spaniards, but no specialty was made of it until 1857. At present it receives much attention in almost every agricultural section of the State. The choicest and hardiest European wine-grapes have been imported, and are rapidly replacing the less desirable varieties. The phylloxera has created great havoc, and the only way of overcoming it seems to be by grafting choice varieties of grapes on native wild vines known as *resistant* vines, which the phylloxera will not attack. The production of wine and raisins (see table below) has reached enormous proportions, and the State supplies the whole country with table-grapes of superior qualities. Fresno County is especially famous for its raisin crop.

Oranges were first planted in Los Angeles, and up to about 1872 the production was confined principally to that region. A large part of the long interior valley has since been found to be adapted to citrus-culture, and the citrus belt now extends along the foot-hills from Shasta to San Diego, a distance of over 700 miles. Owing to the dry warmth of the inner valleys and to the longer days in summer, the fruit ripens at Oroville, Newcastle, etc., six weeks earlier than at Riverside or Pasadena. In southern California oranges are gathered fresh from Christmas to July, and lemons and limes all the year. Nine or more varieties of oranges are grown, and from the sweet navel, or seedless orange, a non-alcoholic wine is made.

In the year 1899-1900 over 17,000 cars of citrus fruit were shipped from the State, the value of which exceeded $8,000,000. The production of prunes is greatest in the Middle Coast counties. The State produces about half of the total crop of the United States, and has outstripped even France. The production of apples, peaches, pears, and cherries is also enormous, but the output for each of these is at least equaled by other States. Berries grow luxuriantly, and in the southern part of the State strawberries are gathered almost throughout the year. The success attending the production of apricots, almonds, olives, figs, and walnuts is of especial interest, inasmuch as the experimental stage has now been passed, and they have come to occupy an accepted place among the staple products of the State. Almonds are grown principally in the central part of the State; olives and walnuts in the southern part; while figs and apricots have a more general distribution. A large number of other tropical or semi-tropical fruits and nuts are now being successfully introduced. Vegetables are raised in great abundance, being shipped abroad. The conditions are especially favorable for the sugar-beet, the State ranking with Michigan in the production of that plant. The following table shows the development of the fruit industry for the last decade:

GENERAL SUMMARY AND COMPARATIVE TABLE OF SHIPMENTS BY RAIL AND BY SEA, OF FRUITS, WINE, BRANDY, AND VEGETABLES (TONS OF 2,000 POUNDS)

KINDS	1890	1892	1894	1896	1898	1900
Green Deciduous	34,042.0	59,374.5	90,692.2	57,638.3	69,732.2	91,176.0
Citrus Fruits	34,209.6	34,857.5	58,964.0	99,156.0	180,658.9	226,500.0
Dried Fruits	32,297.5	29,762.2	51,828.2	48,522.8	76,662.7	90,000.0
Raisins	20,560.1	26,673.4	46,954.4	34,434.6	47,796.3	36,000.0
Nuts	787.1	2,061.9	3,953.5	4,972.6	5,815.8	*
Canned Fruits	40,060.9	55,273.7	60,352.6	45,546.9	52,219.7	75,500.0
Total Fruit by rail and sea, carloads	16,195.7	20,800.3	31,274.4	29,026.7	43,288.6	*
Carloads Wine and Brandy by rail and sea	*	4,832.5	7,663.5	7,609.0	9,014.0	*
Total Fruit, Vegetables, Wine and Brandy by rail and sea, carloads	16,195.7	25,632.8	43,624.7	38,254.0	56,149.6	*

*Not reported.

Thus it will be seen that the horticultural development in California has been rapid and continuous. For certain products, however, further immediate extension seems improbable, as the supply now equals the demand. Such products as can find a foreign market may and do continue to develop.

STOCK-RAISING. The equable climate greatly favors stock-raising. By shifting the stock from the foothills in the summer to the valleys in the winter, pasturage is afforded for the greater part of the year. The increased production of alfalfa has greatly advanced stock-raising. The State was formerly one of the foremost sheep and wool producers, but for twenty-five years the number of sheep has constantly decreased, and at the close of the Nineteenth Century was less than one-half its former size, being about 2,000,000. Large numbers of cattle are shipped into the State from Arizona to be fattened for market. Dairying has but little developed. The general breed of horses is not of a high grade, but there are a number of large horse-raising farms which are noted for their superior breeds, and their trotters, especially, are in great demand in the eastern markets. Ostrich farming is limited to a few ranches.

MANUFACTURES. California has been subject to a variety of conditions, the effect of which has been to guarantee a steady development of the manufacturing industry, but within very definitely restricted limits. The State's comparative isolation and remoteness from other centres of population, and the heavy freight charges necessarily incurred in transportation to and from the State, have given a field free from competition. At the same time, these very conditions have denied entrance into the more extensive market of the world, except with those manufactures for the production of which the State's superior resources give a decided advantage. California is further held back by the high price of labor and the scarcity and consequently high price of fuel. Moreover, the superior advantages offered in mining and agriculture have tended to divert capital from manufacturing. Nevertheless, the value of manufactured products has reached a high figure, being exceeded in but few States. The exceptional resources of field and forest account chiefly for this; but the relation of the State to Hawaii has given rise to a large sugar-refining industry, while mining has created a demand for quantities of machinery and explosive materials.

The total value of manufactured products increased from $66,000,000 in 1870 to $213,000,000 in 1890 and $302,000,000 in 1900. In the latter year there were over 71,000 men, 17,000 women, and 2000 children under 16 years of age employed in manufacturing, constituting in all 6.1 per cent. of the population. Of the fourteen leading branches of manufacture, five were dependent upon agriculture or horticulture. As a wheat-growing State, California early became an important flour-producer, shipping considerable quantities to China and other foreign countries; but with the change of interest from wheat to fruit, the production of flour has slightly decreased, as will be seen from the table appended. The canning and preserving of fruit has now become of equal importance, having almost doubled its value during the decade, and placing California first among the fruit-producing States. In the above, some vegetables are also included, such as tomatoes and peas. The manufacture of liquors, also dependent upon agriculture, is developing at an almost equally rapid rate. The high grade of grapes grown has given rise to the manufacture of wines, whose output now exceeds the total of all the other States, being estimated at $3,000,000. But the malt liquors are as yet of greater value, being estimated at over $5,000,000, the large supply of grain and hops giving a special advantage to this industry. Slaughtering is another thriving industry, especially the branch of it which is concerned with meat-packing, this having increased in value from $2,400,000 to $8,200,000. The production of factory butter, etc., although having practically begun during the decade, has already become important. The State ranks second in the production of beet-sugar, the product for 1900 being valued at $3,500,000. Besides this, San Francisco, being the nearest port

Comparative Summary of Fourteen Leading Industries

INDUSTRIES	Year	Number of establishments	Average number of wage-earners	Value of products, including custom work and repairing
Total for selected industries for State	1900	2,184	37,068	$131,246,019
	1890	1,540	27,536	102,373,233
Increase, 1890 to 1900	......	644	9,532	28,872,786
Per cent. of increase	......	41.8	34.6	28.2
Per cent. of total of all industries in State	1900	17.4	40.7	43.3
	1890	19.4	37.9	48.0
Cars and general shop construction and repairs by steam railroad companies	1900	29	4,920	7,553,626
	1890	10	2,858	4,923,071
Lumber and timber products	1900	313	5,806	13,764,647
	1890	258	4,689	8,794,655
Lumber, planing-mill products, including sash, doors and blinds.	1900	136	2,022	4,807,690
	1890	120	2,127	4,941,466
Printing and publishing, newspapers and periodicals	1900	512	2,683	6,858,192
	1890	376	2,799	6,500,445
Foundry and machine-shop products	1900	250	4,782	12,047,149
	1890	154	3,192	7,767,780
Explosives	1900	7	906	4,283,818
	1890	4	285	2,523,770
Clothing, men's, factory product	1900	96	2,410	3,869,891
	1890	121	1,277	2,568,921
Fruits and vegetables, canning and preserving	1900	136	7,486	13,081,829
	1890	61	5,670	6,211,140
Flouring and grist mill products	1900	124	857	13,100,944
	1890	101	855	14,200,320
Liquors	1900	294	1,496	9,261,600
	1890	201	1,477	5,596,800
Cheese, butter, and condensed milk, factory product	1900	178	402	3,582,942
	1890	19	49	172,579
Slaughtering	1900	58	925	15,717,712
	1890	50	436	9,768,858
Sugar and molasses, refining	1900	6	919	15,909,998
	1890	3	723	22,673,850
Leather, tanned, curried, and finished	1900	45	1,454	7,405,981
	1890	62	1,099	5,729,278

of entry, secures raw sugar from Hawaii for refining. The total value of the amount refined in 1900 was estimated at $15,900,000. Hides were formerly exported, but are now manufactured into leather within the State, and this industry has grown until the local supply of hides no longer equals the demand. The manufacturing interests originally developed in response to the demands of local mining concerns are now beginning to enter other markets. Shipbuilding is also developing. The United States battle-ship *Oregon* was constructed by a California establishment. Over two-fifths of the total product of manufactures was accredited to San Francisco; but the city had no gain during the decade. Los Angeles was the only large city that enjoyed any considerable increase, the product of that city more than doubling in value. This was partially due to the recent discovery of petroleum there, and the use of it as fuel. The foregoing table is a summary for the fourteen most important manufacturing industries in the State.

Lumbering. California, like the other Pacific Coast States, has a remarkable wealth of forest resources; but remoteness from the market and the difficulties of transportation have delayed their exploitation. From the above table it will be seen, however, that lumbering is enjoying a steady growth. The industry centres in the Humboldt Bay region, on the Pacific Coast, but also extends along the western slope of the Sierras as far south as Fresno County. From the immense redwoods of the Pacific Slope, large quantities of lumber and shingles are manufactured, while the equally large firs are used for the building of houses and ships. Among other valuable varieties are the cedar, adaptable for finishing work and furniture; the chestnut oak, used for tanning; and the yellow pine, valuable for lumber and for the production of resin and turpentine. The deciduous trees are not great in variety, nor of much industrial value.

Transportation and Commerce. The long coast line has few excellent harbors, and the inland navigation is not extensive, being confined principally to the Sacramento River, which is navigable for small vessels as far as Red Bluff, and the Colorado, which is navigable through its entire course along the borders of the State.

Railway facilities are well developed, particularly in the great central valley. Only in the northeastern portion of the State is commercial progress seriously retarded by a lack of transportation accommodations. Two important transcontinental lines—the Southern Pacific and the Santa Fé Pacific—enter the State from the south, while a third transcontinental line—the Central Pacific—enters it a little north of the centre, San Francisco being the terminal point of all. On the Central Pacific are 33 miles of wooden galleries, known as 'snow-sheds,' and costing from $40,000 to $1,100,000 per mile, according to the amount of masonry needed. The San Francisco and Northern Pacific makes connection with the railway systems to the north. In 1860 the State had 23 miles of railroad, which had increased in 1880 to 2195 miles, in 1890 to 4349 miles, and in 1900 to 5750 miles. There are 0.27 mile of line per 100 square miles of land territory, and 38.72 miles per 10,000 inhabitants.

Commerce centres mainly at San Francisco, over two-thirds of all the merchandise imported to the Pacific Coast entering, and considerably over half the exports leaving, by that port. The great lumber trade of the Pacific Coast finds its chief market in that city. The other customs districts are Wilmington, San Diego, and Humboldt. There are lines of steamers to Alaska, British Columbia, Oregon, etc., and to New York, Great Britain, Hawaii, China, Japan, Australia, and South America. Its position on the Pacific Ocean gives the State an advantage in the trade with Oriental countries, which is becoming of increasing value, and contains possibilities whose full import can hardly be appreciated at present. The construction of the Isthmian canal will also be greatly to the advantage of the State, especially in its trade with European countries. The cargoes to Europe consist mainly of wheat, canned fish and fruits, honey, borax, and ores; to Asia and the islands of the Pacific, of large quantities of butter and cheese, canned and cured meat and fish; to Mexico and China, of quicksilver. Shipments across the continent include fruits (fresh, canned, and dried), cattle products, and honey. In 1900 the value of imports of merchandise to the California ports aggregated $49,000,000, and the imports of gold and silver $13,000,000, while the exports of merchandise and bullion were $41,000,000 and $9,500,000 respectively.

Banking. In 1900 there were 39 national banks in operation, with capital aggregating $11,000,000, deposits $13,000,000, and reserve fund $4,132,000. There were 178 State banks, with $26,980,000 capital stock, $85,880,000 deposits, and $20,580,000 surplus. The private banks numbered 19, having $890,000 capital and $1,629,000 deposits. There were also 53 savings banks, with $7,650,000 capital stock, $158,000,000 deposits, and $6,900,000 surplus. The average deposit in savings banks was $730, or over 30 per cent. more than in any other State.

Government. The present Constitution was ratified by popular vote and became operative in 1879. A proposed amendment must have a two-thirds vote of each House, and be approved by a vote of the State electors. A proposition to revise the Constitution must likewise receive a two-thirds vote of the Legislature and the approval of the people, and the text drawn up in the resulting Constitutional Convention must also be submitted to the people for their approval.

Males who have lived one year in the State, ninety days in the county, and thirty days in the voting precinct, and have not been convicted of infamous crimes, embezzlement, or misappropriation of public money, and can read the Constitution or write their own names have the right of suffrage; but Chinese are excluded.

Legislature.—Senators (40) hold office for four years, Assemblymen (80) for two years. The Legislature meets in biennial sessions, on the first Monday of January of even years, and the pay of the members ($8 per day and 10 cents mileage) is limited to sixty days. The Governor may convene extra sessions, but the power to legislate at these is restricted to the specified subject. The House impeaches, while the Senate acts as a court of impeachment.

Executive.—The Governor, Lieutenant-Governor, Secretary of State, Controller, Treasurer, Attorney-General, and Surveyor-General are each elected for a term of four years. A two-thirds vote of each House overcomes the Governor's veto. Money appropriation bills may be vetoed in part. In case of a vacancy in the office of Governor, the Lieutenant-Governor takes his place, and in turn is succeeded by the president *pro tempore* of the Senate. The Governor grants reprieves, pardons, and commutations of sentence.

Judicial.—The Supreme Court, the members of which are elected for a term of twelve years, consists of a Chief Justice and six associates, and is divided into two departments, which may sit separately or as one court. Each county has a Superior Court, whose members are elected for a term of six years. Inferior courts are established by the Legislature. No judge of Supreme or Superior Court can receive his salary unless he swears that no case in his court submitted ninety days previous remains unattended to.

Local Government.—There is a uniform system of county governments, and general laws are enacted for the organization of townships. Laws affecting municipal corporations must be general laws, applying to classes of municipalities made upon the basis of population. A city containing a population of more than 3500 may frame a charter for its own government, which, after being approved by the electors of the city, is submitted to the Legislature for its approval or rejection *as a whole.*

Other Constitutional and Statutory Provisions.—No corporation formed under the laws of the State can employ, directly or indirectly, any Chinese or Mongolian, and contracts for coolie labor are void. Appropriations to sectarian schools are prohibited. The legal rate of interest is 7 per cent., but any rate is allowed by contract. Women may enter upon or pursue any lawful business, vocation, or profession, and the property of married women belongs to them alone.

Sacramento is the capital. The State has eight Representatives in the Lower House of the national Congress.

Finances.—The cash receipts of the State for the fiscal year ending June, 1900, amounted to $11,147,000, the cash payments to $9,549,000, and the balance in the treasury to $5,020,000. The State debt on the same date was $2,460,000, of which amount $2,277,000 was held in trust for the State school and university funds.

Penal and Charitable Institutions.—The penal institutions are the prisons at Folsom and San Quentin, the State Reform School at Whittier (which is conducted on the cottage plan, and where farming and various trades are taught), and the Preston School of Industry at Ione City. The charitable institutions include the insane asylums at Napa, Stockton, Agnew, and Ukiah, all of which are under the control of a State Lunacy Commission; the Home for Feeble-minded Children at Glen Ellen; and the Institution for Deaf, Dumb, and Blind at Berkeley. There are also nineteen orphan asylums receiving State aid and inspection.

Militia.—According to the United States official Army Register for 1901, the total strength of the State militia is as follows: General officers, 4; general staff officers, 44; regimental field and staff officers, 33; company officers, 144; rank and file, 3059; aggregate, 3304. The force is organized into one division of three brigades and seven regiments. There were in 1900 378,000 males of militia age, 212,000 of whom were liable for duty.

Education. California ranks among the progressive States in its educational policy. The educational system is wide in scope and thorough in administration, and the length of the school year (165 days) is exceeded in only one or two States west of the Alleghanies. The State has succeeded better than most States in dealing with the rural school problem, but still suffers from an undue multiplication of small rural districts. The compulsory school law is not generally enforced. Of 361,000 children between the ages of 5 and 17, in 1900, 266,700 were enrolled in the public schools and 23,300 in private schools. The kindergarten grades enrolled 4400; the primary grades, 170,000; the grammar grades, 82,000; and the 120 high schools, 12,100. Of the teachers of primary and grammar grades, 1100 were males and 6000 females. The average of the salaries paid to male teachers is $81 per month, and to females, $65.50, being much higher than the average for the Western States. The average annual expenditure for primary and grammar grades per child of school age is about $17. About one-half of this is provided for by State apportionments, about one-third by county apportionments, and the remainder by city or district taxes and other sources.

There are five normal schools. The State University at Berkeley, an outgrowth of the State College (chartered in 1855), has a liberal endowment. Its schools of law, medicine, etc., are in San Francisco. Lick Observatory (q.v.) is also connected with it. Leland Stanford Junior University, at Palo Alto, is one of the most heavily endowed educational institutions in the world. Both of the foregoing institutions are coeducational, and in rank take their place with the foremost institutions of the country. Other colleges are: The University of Southern California, Los Angeles, with its school of agriculture at Ontario and theological school at San Fernando; the Roman Catholic colleges at San Francisco, Los Angeles, Oakland, and Santa Clara; the Pacific Methodist, at Santa Rosa; California College, at Oakland; Pomona College, at Claremont; and the University of the Pacific at San José. The Cogswell Polytechnic College, at San Francisco, is maintained by the city. There are theological schools at Oakland, San José, and San Rafael; art schools at San Francisco, San Diego, and Sacramento. The California Academy of Sciences, founded in 1853, and endowed by James Lick (q.v.), is at San Francisco.

Religion. From an early date the Roman Catholics have been very active in missionary work. Nearly all the Spanish element of the population, and a large part of the Indian population, are members of that Church, making it numerically the strongest religious denomination. The Methodists, Presbyterians, Congregationalists, and Baptists follow, in the order named, and the other leading denominations are represented. Even with the large Catholic element, but 23 per cent. of the population are church communicants.

Population. California is the most populous of the Western States, and ranks twenty-first in population among the States of the Union. The following is the population by decades: 1850, 92,600; 1860, 379,900; 1870, 560,200; 1880, 864,700; 1890, 1,208,100; 1900, 1,485,000. (For population by counties, see table on back of the map.) The per cent. of increase for the last decade (22.9) was greater than that for the whole country. Of fifty-seven counties, all but eleven increased in population. About one-fourth of the population of the State is foreign born, the Irish, Germans, and English, in the order named, being most numerous. The State has a Mongolian population about equal to that of the rest of the United States, the Chinese numbering 45,700 and the Japanese 10,150. The former have greatly decreased in numbers, and the latter increased, during the last decade. Fifty-five per cent. of the population are males, the large predominance of this sex among the Mongolians being partly responsible for this result. The Indians number 15,300, and the negroes 11,000. Most of the Indians are taxed, and have made considerable progress in civilized life. The most decided increase during the decade was on the part of the natives born of foreign parents, this class exceeding 21 per cent. of the total population.

There are 9.5 individuals to the square mile, and a decided tendency is manifested to segregate in cities. There are twenty-four places having a population above 4000, their inhabitants constituting 48.9 per cent. of the total population, though in seven States the percentage is higher. The following are the leading cities: San Francisco, 342,700; Los Angeles, 102,400; Oakland City, 66,900; Sacramento, 29,200; San José, 21,500; San Diego, 17,700; Stockton, 17,500; Alameda, 16,400; Berkeley, 13,200; Fresno, 12,400.

Indians.—The Indians in 1900 numbered 7654, who were located on twenty-six reservations —namely, Hupa Valley, Round Valley, Tule River, Yuma, and twenty-two mission reservations. They are from a large number of tribes, and represent at least fourteen different linguistic stocks. At least one-half of them can speak enough English to carry on ordinary conversation, and the greater number wear citizens' clothing. They are, as a rule, self-supporting, rations being issued only to the old and infirm. In some of the reservations, not only stock-raising, but farming and fruit-growing, have attained a considerable development. The Indians of the Yuma Reservation are the most primitive in the State, living principally upon fish and the mesquit-bean, which abound on the reservation.

HISTORY. The name California first appears in a Spanish romance, published in 1510, as that of an island lying somewhere in the western sea near the equator. The term was originally applied to what is now Lower California, which was visited by the Spanish as early as 1533. Later the name was extended to the whole western coast of North America below the parallel of 42°, and the distinction of Upper and Lower California was introduced. The first exploration within the limits of the State was done in 1542 and 1543, when Cabrillo visited the coast and islands of the Santa Barbara region. In 1579 Sir Francis Drake sailed as far as the forty-third degree of latitude, and named the country New Albion, but did not, as is generally supposed, enter the Bay of San Francisco. In 1602 and 1603 Vizcaino explored the bays of San Diego and Monterey, and sailed as far north as Point Reyes. The Spanish attempted to civilize the country by the establishment of missions along the coast. In 1769 the first mission in California proper was erected at San Diego by the Franciscans, and by 1823, when the last and most northerly station had been planted at Sonoma, these religious houses had grown to 21 in number, and acquired great wealth in olive, orange, and grape plantations, and cattle and horse ranches. The Indians were early converted to Christianity, gradually weaned from their nomadic and barbaric state, and induced to lead a settled life. They were taught farming and other civilized pursuits and became in time a peaceful and industrious people. The Spanish Government, which intended eventually to turn the mission estates into administrative districts, never acknowledged the title of the priests to the land, and in 1777 began the founding of pueblos or towns. Upper California was divided into the four provinces of San Diego, Santa Barbara, Monterey, and San Francisco. After the Mexican Revolution of 1821, the missions began to decline. The Indians were partly emancipated in 1826, and the process of secularization, which began in 1833, was completed by 1845. Commerce with foreign nations, which was at first forbidden, became very large after 1822. In 1826 the first American immigrant wagon train entered California. In 1840 Monterey was made the capital, and a year later the Russians, who had maintained a trading-post north of Bodega Bay since 1812, abandoned it.

Under the Mexican Republic California enjoyed virtual autonomy, and after 1840 its independence was seen to be inevitable. A silent conflict arose between those who favored ultimate annexation to the United States and the large class of property-owners who were inclined to favor the establishment of a British protectorate. In the southern part of the State, Larkin, the United States consul, was secretly endeavoring to stir up a revolt against Mexico and to bring about the extension of the jurisdiction of the United States over the country. But before his schemes had attained full maturity, a rising of the American settlers in northern California took place. On June 14, 1846, a small party of Americans, aided by John C. Frémont, who was then in California at the head of an exploring expedition, seized the town of Sonoma, raised the Bear Flag, and on the fourth of July proclaimed the independence of California. Commodore Sloat, acting under orders from the United States Government, which was then preparing to go to war with Mexico, seized Monterey and Yerba Buena (San Francisco), and the conquest of the country was completed by Commodore Stockton, Colonel Frémont, and General Kearney. On August 15, 1846, California was declared a Territory of the United States.

The discovery of gold at Sutter's Mill, near Coloma, on January 24, 1848, gave an impetus to immigration from all parts of the globe. The great body of gold-seekers, 'the Argonauts,' arrived in 1849, and by the end of the year the population exceeded 100,000. Nearly all the newcomers were unmarried men, in haste to get rich. Hence the organization of an authoritative body, responsible for public order, was neglected or hindered by the influx of lawless characters. There ensued reckless speculation, extravagant living, and easy-going morality in many localities. Stable elements, however, were not wanting—the mining camps had stringent laws of their own, and lynch law was resorted to in many quarters. Life and property, however, were not well secured. The people were heavily taxed without representation, and though San Francisco had been made a port of entry and United States customs laws had been extended over the country, no Territorial government had been granted. On November 13, 1849, after several unsuccessful attempts at State-making, a constitution, in which slavery was prohibited, was adopted by the people, and on September 9, 1850, California entered the Union. (For national events connected with the State's admission, see UNITED STATES, and COMPROMISE MEASURES.) In 1851 the citizens of San Francisco formed a vigilance committee to check lawlessness in that city. The committee tried offenders, banished and hanged at its discretion, and performed its duties so efficiently that in 1856 it was reorganized to meet a new outburst of public disorder and official corruption. When the Civil War broke out, California, which was thought to be contemplating secession, was exempted from furnishing troops. The Union party, however, was dominant, and contributed nearly $1,500,000 to the Federal Government, and sent five companies of volunteers into the field.

Since the Civil War California has experienced a magnificent economic development. The completion of the Union Pacific Railroad furthered the prosperity of the State. Both from the Eastern States and from across the Pacific the tide of immigration flowed in steadily. So considerable, indeed, did the number of Chinese immigrants become that between 1870 and 1890 the Chinese question dominated State politics and influenced national legislation. In the mining districts the Chinese occupied claims which had been abandoned as exhausted by their original proprietors, or acted as cooks and menial servants. In the towns they performed various duties. Their stolid patience and their capacity for long and sustained work made them in one way ideal laborers for the development of a new country; but their extreme frugality and their willingness to work for a small wage made them formidable competitors of white labor. (See CHINESE IMMIGRATION.) In 1878 and 1879 Dennis Kearney (q.v.), a gifted agitator, taking advantage of the discontent prevailing among the lower classes of San Francisco, owing chiefly to the question of Chinese immigration, organized the Workingmen's Party, which for a short time controlled State politics and brought into being the present Constitution of California, with its many radical features. The conflict between the mining and agricultural interests over the utilization of the natural water-power of the State was removed in a great measure by prolonged and elaborate legislation on the subjects of mineral débris and drainage. In 1887 a comprehensive system of irrigation was begun, which has yielded great results. The California International Midwinter Exposition, held at San Francisco in 1894, served to illustrate the progress and prosperity of the State. Before 1860 California was Democratic in national politics. Since that date it has been Republican, with the exception of the years 1880 and 1892. In State elections California has changed from Democratic to Republican repeatedly on local issues. The trend and change of politics in California may be gathered from the following list of Governors of the State:

MILITARY AND PROVISIONAL GOVERNORS.

Col. Robert F. Stockton	1846–47
Col. John C. Frémont	1847
Gen. S. W. Kearney	1847
Col. R. B. Mason	1847–49
Gen. Persifer F. Smith	1849
Gen. Bennet Riley	1849

STATE GOVERNORS.

Peter H. Burnett	Democrat	1849–51
John McDougall	"	1851–52
John Bigler	"	1852–56
J. N. Johnson	Know-Nothing	1856–58
John B. Weller	Democrat	1858–60
Milton S. Latham	"	1860
John G. Downey	"	1860–61
Leland Stanford	Republican	1861–63
Frederick F. Low	"	1863–68
Henry H. Haight	Democrat	1868–72
Newton Booth	Republican	1872–75
William Irwin	Democrat	1875–79
George C. Perkins	Republican	1879–83
George Stoneman	Democrat	1883–87
Washington Bartlett	"	1887
R. W. Waterman	Republican	1887–91
H. H. Markham	"	1891–94
J. H. Budd	Democrat	1895–99
Henry T. Gage	Republican	1899–1903

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CALIFORNIA, GULF OF. An arm of the Pacific, separating the peninsula of Lower California from the rest of Mexico (Map: Mexico, B 2). It was originally known as the Sea of Cortez, having been discovered under his auspices and explored by himself. It is 700 miles in length, and varies in width from 70 to nearly 150 miles. It receives at its upper end the Colorado, and from the east several streams, chief of which are the Altar, Sonora, Yaqui, and Mayo. Both shores are bordered by highlands broken by the river valleys on the east, but on the west presenting an almost unbroken mountain wall. The coast-line is irregular and forms numerous small bays. The gulf has a depth ranging from 600 feet near the head to over 6000 feet near its mouth, and contains many islands, particularly in the upper part, the largest of which are Angel de la Guarda and Tiburón. On its western shores are the ports of San Felipe, San José, and La Paz; on its eastern, those of Mazatlan and Guaymas. There are pearl-fisheries on the western coast.

CALIFORNIA, Lower, or Old (Sp. *Baja* or *Vieja California*). A peninsula in southwest North America, forming a Territory of Mexico (Map: Mexico, B 3). It extends from about latitude 22° 40′ to 32° 40′ N. It is bounded by California on the north, the Pacific on the west, and the Gulf of California and the Mexican State of Sonora on the east. Its total length is over 750 miles, while its width varies from about 30 to 140 miles. Area, 58,328 square miles. The surface is generally mountainous, the peninsula being practically an extension of the Sierra Nevada and Coast Range region. At the centre is a plateau region interrupted by mountain peaks and short ranges, Santa Catalina, in the northern central part, attaining an altitude of over 10,000 feet. An eastern coast range borders the Gulf of California, and in places attains elevations considerably exceeding 6000 feet. The western coast range, bordering the Pacific, is less elevated and seldom exceeds 3500 feet in altitude. At the extreme south the peninsula terminates in an immense mountain mass, rising in San Lázaro to 8000 feet altitude. The coasts are considerably indented, but there are not many really good harbors. The principal islands are Angel de la Guarda, off the central eastern coast, and Cedros (Cerros), off the opposite western coast. Numerous smaller islands are scattered along the southeastern coast, and a few long, narrow islands fringe the southwestern coast. The climate and vegetation of the western portion resemble those of southern California. The climate is dry and warm, the rainfall in most of the region ranging from under 10 to 25 inches, which, with a high temperature, is a small amount. Few streams occur of any importance except as irrigators. They are most numerous in the southwest. In the southern part are considerable areas of uninhabitable land. Population, in 1895, 42,245.

CALIFORNIA, Southern, University of. A Methodist Episcopal educational institution, situated at Los Angeles, California. The university was founded in 1880, and in 1901 had endowment and productive funds amounting to about $130,000, buildings and grounds valued at $70,000, an income of about $12,000, and a library of 4000 volumes and 3000 pamphlets. At the same time the collegiate and preparatory faculty numbered 92, and the total number of students, of whom over one-half were in the preparatory department, 518. In the collegiate department courses are maintained in the classics, art, oratory, music, medicine, law, and dentistry. President, George P. Bonard, A.M., D.D.

CALIFORNIA, University of. A leading American university, situated at Berkeley, California. The university was established in 1868, under the general provision for agricultural colleges made by the Congressional act of 1862, which united with it the College of California, chartered in 1869. Instruction was begun in Oakland in 1869, and the university was transferred to its present location in 1873. The government of the university is vested in the Regents of the University of California, a corporation, consisting of the higher State officers, the presidents of the State Agricultural Society, of the Mechanics' Institute of San Francisco, and of the University of California, all acting as members ex officio, and of sixteen other members appointed by the Governor of the State. The university is in effect a State institution, receiving various State appropriations for specific purposes, and in addition receiving the benefits of a tax of 2 per cent. on each $100 of assessed valuation. As a State institution, it is obliged to make reports to the Legislature, and to be under that body's general jurisdiction.

The university comprises the following departments of instruction: In Berkeley, the colleges of Letters, Social Sciences, Natural Sciences, Commerce, Agriculture, Mechanics, Mining, Civil Engineering, and Chemistry; on Mount Hamilton, in Santa Clara County, the Lick Astronomical Department; in San Francisco, the Mark Hopkins Institute of Art, Hastings College of Law, Medical Department, Post-Graduate Medical Department, Dental Department, California College of Pharmacy. Among the colleges at San Francisco, the Institute of Art, founded by Edward F. Searles in 1893, is occupied by the San Francisco Art Association, affiliated with the university and maintaining the California School of Design, founded in 1874. The Medical Department was organized in 1873 by the absorption of the Toland Medical College. The Post-Graduate Medical Department (the San Francisco Polyclinic) was affiliated with the university in 1892. The Dental Department was organized in 1888. The Lick Observatory on Mount Hamilton was founded in 1875 by James Lick, who devoted $700,000 to the purpose, among other things, of constructing "a telescope superior to and more powerful than any telescope ever made." The Department of Anthropology, organized primarily for research, conducts excavations in Egypt, Peru, and North America, and pursues linguistic and ethnological investigations.

In consideration of its official relation to the State and of the funds given to it yearly by the State, the University of California makes no charge to students resident in California for courses in the colleges of Letters, Social Sciences, Natural Sciences, Commerce, Agriculture, Mechanics, Mining, Civil Engineering, and Chemistry. The instruction in all the colleges is open to properly qualified persons, without distinction of sex. Students not residents of the State are charged a nominal fee for tuition. Since 1888, when its total student body numbered only 306, the university has grown very rapidly. A large part of this growth should probably be ascribed to the establishment and equally rapid growth of Leland Stanford Junior University, by which a friendly rivalry in educational matters was instituted. In 1902 there were 4006 students enrolled in the University of California, of whom 952 were in the College of Social Sciences, 284 in the College of Letters, 248 in the College of Mining, 194 in the College of Natural Sciences, 190 in the College of Mechanics, 186 in the Mark Hopkins Institute of Art, 156 in the Medical Department, and 171 in the College of Chemistry, 825 in the summer session, and 37 in the short course in dairying. The undergraduates numbered 2248, the graduate students 230, omitting summer-session students. At the same time there were 481 professors, instructors, lecturers, and administrative officers, of whom 201 were in the academic department. Nearly one-half of the university's students are women. A relatively large proportion of the students pursue the general academic courses, as compared with the technical or professional courses. It is to be noted, furthermore, that a relatively large proportion choose courses which may be termed humanistic; those namely in languages, literature, history, and philosophy. Hardly more than 5 per cent. of the student body are non-residents of the State.

In 1896 Mrs. Phœbe A. Hearst, already a large benefactor of the university, offered to bear the expenses of an international architectural competition for the purpose of securing a general plan for a great campus on the Berkeley site; and Mrs. Hearst also agreed to erect two of the necessary buildings thereon. Preliminary competitive plans were voted upon by an international jury at the Royal Museum of Fine Arts in Antwerp in 1898. The successful candidates then prepared final plans, and these were voted upon by the same jury in San Francisco in 1899. The final plan adopted was that of M. Emile Bénard, of Paris. The plan provides not only for a campus, but for a complete series of university buildings. The estimated cost of carrying out the plans in their entirety is from $10,000,000 to $12,000,000. Mr. John Galen Howard, of New York, has been appointed supervising architect. The first building which he will erect will be the Hearst Memorial Mining Building.

The present value of the buildings and grounds belonging to the University of California is (1901) $4,516,824. Its endowment and special funds aggregate $3,035,027, and its total income derived from all sources is about $550,000. The library contains over 88,000 volumes, but a strong effort is being made to increase this number largely, since the university, separated as it is from the book centres of the East, stands in relatively greater need of books than would an Eastern university.

The presidents of the university have been Henry Durant, Daniel C. Gilman, John LeConte, W. T. Reid, E. S. Holden, Horace Davis, Martin Kellogg, and Benjamin Ide Wheeler, Ph.D., LL.D., formerly professor of Greek and comparative philology in Cornell University, elected in 1899.

CALIFORNIA POPPY. See Eschscholtzia.

CALIG'ULA. A tragedy by John Crowne, published in 1693 with a dedication to the Earl of Romney, and written in rhymed heroics.

CALIGULA, Gaius Cæsar Augustus Germanicus (12-41). Emperor of Rome from A.D. 37 to 41. He was the youngest son of Germanicus (nephew of Tiberius) by Agrippina, and was born August 31, A.D. 12, at Antium, and was educated in the camp, where the soldiers gave him the nickname Caligula, from the military boots (*caligæ*) which he wore. On the death of his brother Drusus, he was made augur in his stead; and on the death of Tiberius (A.D. 37), who, it was suspected, had received foul play at his hands, it was found that he had been appointed co-heir along with the grandson of Tiberius, but the Senate and the people allowed Caligula supreme and sole authority. In the beginning of his reign he appeared hardly likely to fulfill the threat of Tiberius, who had talked of educating Caligula "for the destruction of the Roman people." He was, to appearance, lavishly generous and merciful, pardoning even those who had been the instruments of cruelty against his own family. But this ostentatious magnanimity was itself a disease, an unwholesome affectation, founded on no principle, or even humanity of heart, and co-existed with the most savage voluptuousness and lust. Consequently, when illness, the result of his vicious life, had weakened his faculties, the lower qualities of his nature obtained the complete mastery. In addition to the senseless prodigality with which he commenced his career—expending in one year the enormous wealth left by Tiberius, 720,000,000 sesterces—he began to manifest the most barbarous propensities. He banished or murdered his relatives, excepting his uncle Claudius and sister Drusilla (with whom he carried on incestuous intercourse); filled Rome with executions, confiscating the estates of his victims; amused himself, while dining, by having victims tortured and slain in his presence; and uttered the wish "that all the Roman people had but one neck, so that he might decapitate Rome at a blow!" To vie with Xerxes, he made a bridge of ships over the bay between Baiæ and Puteoli (a distance of three Roman miles and 600 paces), and celebrated the exploit by a costly banquet on the middle of the bridge, and by collecting on it great numbers of people, and causing them to be drowned. His favorite horse was stabled in a palace, fed at a marble manger with gilded oats, was made a member of the college of priests, and afterwards raised to the consulship. As a climax to all his absurdities, he declared himself a god, and had temples erected, and sacrifices offered to himself. At length a conspiracy was formed by the officers of his guards, and he was assassinated A.D. 41. His life is told by Suetonius. See also Baring-Gould, *The Tragedy of the Cæsars* (London, 1892).

CALIGULA, Bridge of. A so-called bridge prepared by Caligula to facilitate his passage from his palace on the Palatine Hills to the Temple of Jupiter on the Capitol. In reality, the 'bridge' consisted of wooden passageways leading across the streets, from roof to roof of intervening buildings.

CALIGULA, Palace of. The home of Caligula on the Palatine Hills overlooking the Forum. The palace was an extension of the palace of Tiberius, built over the site of the houses of Cicero and other rich men, and rising from the Nova Via to a height of 150 feet on substructures, to which the extant ruins belong. The superstructure has entirely disappeared. The best preserved portion of the remains is the crypt-porticus in which Caligula was murdered on January 24, A.D. 41.

CALINGA, kȧ-lēn'gä. A name under which various wild natives of northern Luzon are sometimes grouped. See Philippines.

CALIPERS (corrupted from *calibre;* see Calibre). An instrument for measuring the diameter or thickness of objects. If a pair of ordinary dividers be applied to an object so that the extreme points of the diverging legs embrace it, the distance between the points of the two legs will be the exact thickness of the object, and this distance can be determined in the usual units of length by applying the points to a scale and reading off the space subtended by them. This is the simplest form of calipers. If the dividers have a graduated arc attached, so arranged that it records exactly the distance apart of the points of the legs, we then have a registering calipers. Calipers of this general form are made in a variety of shapes and with a variety of registering and adjusting devices for special purposes. Generally the legs, instead of being straight like the legs of dividers, are curved so as to converge toward each other at the extreme points. Fig. 1 shows a form of calipers for rough measurements such as measuring the diameter of rolled rods or the thickness of rolled plates. Fig. 2 shows a form of calipers, known as micrometer calipers, for very precise measurements. The mechanical principle embodied in the construction is that of a screw in a fixed nut. An opening to receive the work to be measured is afforded by the backward movement of the screw, and the size of the opening is indicated by the graduations. The pitch of the screw, or distance between its threads, is forty to the inch in this particular calipers, and the graduations on the barrel are forty to the inch and are figured 0, 1, 2, etc., at every fourth division. As these graduations conform to the pitch of the screw, each division equals the longitudinal distance traversed by the screw in one complete revolution, and shows that the calipers has been opened $\frac{1}{40}$ or $\frac{25}{1000}$ of an inch. The beveled edge of the thimble is graduated into twenty-five parts and is figured at every fifth division, 0, 5, 10, 15, 20, etc. Each division when coincident with the base-line of the divisions on the barrel indicates that the gauge-screw has made $\frac{1}{25}$ of a revolution and that the opening of the calipers has increased $\frac{1}{25}$ of $\frac{25}{1000}$ or $\frac{1}{1000}$ of an inch. Hence to read the calipers multiply the number of divisions visible on the scale of the barrel by 25, and add the number of divisions on the scale of the thimble from zero to the line coincident with the base-line of the graduations on the barrel. For example, as the calipers is set in the illustration, there are three whole divisions visible on the barrel. Multiplying this number by 25 and adding 5, the number of divisions registered on the scale of the thimble, the result is $\frac{80}{1000}$ of an inch. There are also special forms of micrometer calipers for the accurate measurement of V-threads on screws, bolts, etc., and calipers for measuring the depths and thickness of gear-teeth and other purposes. A common form of calipers, known as vernier calipers, is shown by Fig. 3. (See VERNIER.) See GAUGES.

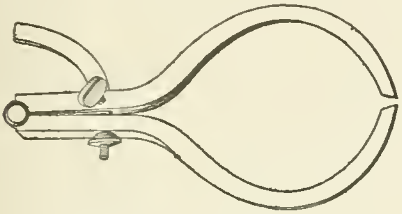


FIG. 1. SIMPLE CALIPERS.

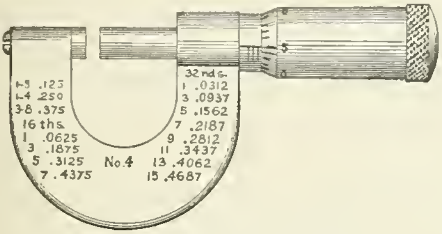


FIG. 2. MICROMETER CALIPERS.

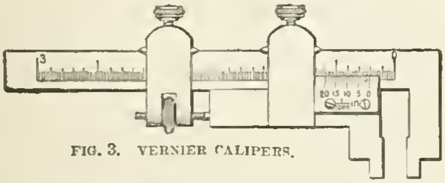


FIG. 3. VERNIER CALIPERS.

CA'LIPH (Fr. *calife*, Ar. *khalifa*, successor, from *khalafa*, to succeed). The title of Mohammed's successors in temporal and spiritual power, from which the early Empire of Islam is known as the Caliphate. While the first impulse of conquest given to the Arabs by the new faith endured, the power of the caliphs was vast, covering the whole world of Islam; but with time the usual consequence followed the combining of spiritual authority with temporal dominion. The caliphate became the subject of factional strife and a prize for ambitious leaders, and rival dynasties broke Islam up into independent powers united only in enmity to the unbeliever. The first four caliphs (632-661), Abu Bekr, Omar, Othman, and Ali, were generally recognized as true successors to the spiritual authority of the Prophet, all being members of his immediate family, though under Ali, who was assassinated, there were insurrectionary movements. The Ommiads (661-750) held a more doubtful title, but still one that was recognized. With the accession of the Abbassides the Mohammedan world was divided, a survivor of the Ommiads founding in Spain the emirate (later caliphate) of Cordova. This was never a true caliphate according to Mohammedan law, but it was one of the greatest in wealth and civilization of all the Mohammedan empires. The Abbasside dynasty saw other rivals arise, the Aglabites and Edrisites in Africa, as well as minor claimants. It was the story of the feudal world everywhere—emirs seizing sovereign power whenever the opportunity offered. From the Tenth Century on, the Abbasside caliphs were mere creatures of the powerful Turkish guards, rashly organized by the Caliph Motassem (833-842). In 1258 another Motassem, the last Abbasside caliph, was put to death by Hulaku Khan (see MONGOL DYNASTIES; PERSIA). Nominal successors of the caliphs performed the spiritual functions of the office in Egypt as late as the Sixteenth Century, when the Turkish sultans reunited the spiritual and temporal headship of Islam in their own persons. There was a Shiite (q.v.) caliphate instituted in Persia in 1502. The first four caliphs had their capital at Medina; the fourteen Asiatic Ommiads made Damascus their seat of power; while Bagdad was that of the thirty-seven Abbassides. There was also established at Cairo in Egypt (909-1171) a dissenting caliphate, that of the Fatimites. Twenty-two Ommiads (756-1031) of the Spanish line ruled in Cordova. See ABBASSIDES; FATIMITES; OMMIADS; and separate articles on the greater caliphs. Consult, also: Sir William Muir, *Annals of the Early Caliphate* (London, 1883), and *The Caliphate: Its Rise, Decline, and Fall* (London, 1891), an abridgment of the *Annals*, with a continuation to the fall of the Abbassides; Weil, *Geschichte der Chalifen* (5 vols., Mannheim and Stuttgart, 1846-62); Syed Ameer Ali, *A Short History of the Saracens* (New York, 1899); S. Lane Poole, *The Mohammedan Dynasties* (London, 1894).

CALIP′PIC CYCLE. See PERIOD.

CAL′ISA′YA BARK. See CINCHONA.

CALIS′TA. (1) The vengeful wife of Altamont and mistress of the 'gay' Lothario, in Rowe's *Fair Penitent*. The rôle was a great favorite with Eighteenth Century actresses. (2) The wife of Cleander in Massinger and Fletcher's *Lover's Progress*. She is possessed of an intense passion for Lysander, but still remains true to her husband. The character was largely suggested by Caliste, in Daudiguier's *Lysandre et Caliste*. (3) The lady-in-waiting and confidante of Queen Berengaria, in Scott's *Talisman*. She assists in a silly and dangerous trick against Sir Kenneth, by which he is lured away from guarding the royal standard.

CAL′ISTHEN′ICS. See GYMNASTICS.

CAL′IVER (from Fr. *calibre*, calibre, bore; see CALIBRE). A matchlock or firearm about midway in size and character between an arquebus (q.v.) and a musket, and small enough to be fired without a rest or support. It could be discharged much more rapidly than a musket, but did not do as much execution. It was introduced in the Sixteenth Century and received its name from the fact that the bore was of uniform *calibre*, so that the common stock of bullets for a company might fit all weapons.

CALIXTINES, kȧ-liks′tĭnz. A name given (1) to the conservative wing of the Hussites (q.v.) (from Lat. *calix*, cup, chalice), because they contended for lay communion in both kinds; (2) to the followers of Georg Calixtus (q.v.) in the latter half of the Seventeenth Century.

CALIX′TUS. A name borne by three Popes. CALIXTUS I. Bishop of Rome from 219 to 223. He was born a slave.—CALIXTUS II. Guido of Vienne. Pope from 1119 to 1124. He was a son of the Count of Burgundy. He expelled the Anti-Pope Gregory from Rome in 1120, stormed the castle in which he took refuge, and made him a prisoner. He concluded with Henry V. of Germany the famous Concordat of Worms (1122), by which the long dispute over the question of investiture (q.v.) was adjusted.—CALIXTUS III. Alonzo de Borja or Borgia. Pope from 1455 to 1458. His leading idea was to institute a great crusade against the Turks, in which he failed.

CALIXTUS, GEORG (1586-1656). A German Lutheran theologian. He was born at Medelbye in Schleswig, and studied at Flensborg and Helmstädt. After traveling as an earnest student for four years in Germany, Holland, England, and France, where he made the acquaintance of the most learned men of his time, he returned to Helmstädt in 1613, and in the following year was appointed professor of theology. His genius, the depth of his knowledge, and his large experience of the world and of men, which he had acquired in his travels, developed in him a spirit of great tolerance toward all who held their religious opinions honestly, whatever these might be. Although his dissertations on the Holy Scripture, transubstantiation, communion in one kind, etc., are acknowledged by learned Catholics to be the most solid and admirable which have been composed by Protestants against the distinctive doctrines of Catholicism, he was, on account of some statements in his work entitled *De Præcipuis Religionis Christianæ Capitibus*, which seemed favorable to Catholic dogmas, and of others in his *Epitome Theologiæ Moralis*, *De Tolerantia Reformatorum*, etc., which approached too near to the Reformed or Calvinistic standpoint, declared guilty of abominable heresy by the adherents of the letter of the Concordienformel—i.e. the orthodox and dogmatically rigid Lutherans. Calixtus felt keenly that the polemical harshness of Lutheranism was a serious obstacle in the way of a great Catholic Christianity, and that Protestantism must assume another form before it could hope to become the religion of Europe. Under this conviction, Calixtus endeavored to show that the oldest and most fundamental articles of the Christian faith—viz. the facts embodied in the "Apostles' Creed"—were common to all Christian sects. In subsequent dissertations, having stated that the doctrine of the Trinity was less distinctly taught in the Old than in the New Testament, and that good works were necessary to salvation, and finally, at the religious conference of Thorn in 1645, whither he was sent as a mediator by the Elector of Brandenburg, having been on more intimate terms with the Calvinistic than the Lutheran theologians, Calixtus was accused of apostasy. Fortunately, however, he had powerful friends, who stood firmly by him, and through their help he was enabled to retain his professorial chair till his death in Helmstädt, on March 19, 1656. For his biography, consult: E. L. W. Henke, *Calixt und seine Zeit* (Halle, 1853-56); W. C. Dowding, *German Theology During the Thirty Years' War*; and *The Life and Correspondence of G. Calixtus* (London, 1863).

CALKIN, ka̤′kĭn, JAMES (1786-1862). An English organist and composer, born in London. He studied under Thomas Lyon and Dr. Crotch; was organist of the Regent Square Church, Gray's Inn Road, for thirty years, and was prominently identified with the Philharmonic Society in its early years, serving for some time as one of the directors. His compositions include a symphony for orchestra, an overture, several string quartets, and numerous pianoforte pieces.

CALKING, ka̤k′ĭng (probably OF. *cauquer*, to tread, from Lat. *calcare*, to tread in, from *calx*, heel). A process in which oakum is forced into the seams between the planks of a deck or the sides of a wooden ship in order to prevent the entrance of water. After the seams are spread, as much oakum is forced in as possible until they are nearly filled. They are then payed (i.e. filled up) with pitch, cement, or putty. Special chisel-shaped tools are used in calking, called *calking-irons*, *making-irons*, *raising-irons*, and *reeming-irons*. The edges of iron plates are also made water-tight by calking. In the case of flush edges or butts the calking-tool commonly straddles the seam; but when one plate laps another its edge is driven down by the tool against the under plate.

CALL. A term often used in reference to various theological and ecclesiastical subjects. (1) The command or invitation to believe in Jesus Christ is designated the *call of God*, or the *Gospel call*. Calvinistic theologians make a distinction between a *general* call and a *special* or *effectual* call. The former is addressed, they say, to all to whom the word of God comes; but it is insufficient of itself to induce any man to the act of faith, and requires for its efficacy that it be accompanied by the special and irresistible grace of the Holy Spirit. They are careful, however, to state that the general or outward calling by the word always precedes and accompanies the special and effectual calling of the Spirit. The notion of an inward call by the Spirit of God in the soul, unconnected with outward calling by the word, belongs not to Calvinistic, but to mystic theology. (2) A call to office in the Church, and particularly to the ministry of the Gospel, is regarded by Christians generally as proceeding from God; and the Church of England requires of candidates for ordination an express profession that they trust they are so moved of the Holy Ghost. (3) A call by the people who are to be under the pastoral care of a minister has been generally regarded in the Christian Church as necessary to the establishment of the pastoral relation. In established churches the matter has been complicated by patronage rights. Often in the Church of England the local congregation has had no voice whatever in the call of its minister. In Scotland the question has given rise to some of the principal ecclesiastical divisions. In the Established Church the formal acceptance of the nominated minister by the people was always professedly sought. The 'Free' Churches of England and Scotland, however, have alone secured the true supremacy of the congregation. In America, almost all denominations professedly give the call of the minister entirely into the hands of the local church or congregation; and where not professedly, even there it is actually so placed in most bodies, and the tendency is every day stronger toward the complete autonomy of the local body in this matter. See PRESBYTERIANISM; CONGREGATIONALISM; METHODISM; CHURCHES.

CALL. When subscriptions to a joint stock enterprise do not require payment at once of the full amount of shares, it is frequently provided that a certain proportion shall be paid in cash, the remainder being subject to call upon the part of the management. The term call is also applied to the amount of these delayed payments. See STOCK EXCHANGE.

CALL, WILKINSON (1834—). An American lawyer and politician. He was born in Russellville, Ky., but early in life went to Florida, where he became a lawyer. In the Civil War he rose to the rank of adjutant-general in the Confederate Army. He was elected to the United States Senate in 1865, but was not permitted to take his seat. In 1879 he was again elected, and thereafter served continuously, as a Democrat, until 1897.

CAL'LA (Lat., an uncertain plant). A genus of plants of the order Araceæ. The genus Calla is characterized by a flattened spathe within which is a cylindrical spadix covered with naked flowers, appearing as a mere mixture of stamens and pistils. The only species, *Calla palustris*, is found in swamps in Europe, Siberia, and North America, but not in Great Britain. It has a creeping rootstock, and heart-shaped, stalked leaves, prolonged into a point; the spathe is white, and the spadix yellow. The rootstock is extremely acrid; but, being deprived of its acridity by grinding, boiling, and macerating, is made by the Laplanders into a kind of bread called *missebroed*, which they hold in high estimation. The well-known and beautiful calla-lily (*Richardia Æthiopica*) was formerly included in this genus.

CALLAO, kä-lyä'ō (Sp. *cala*, creek, bay, from Celt. *cala*, harbor). The principal seaport of Peru and capital of the small province of the same name, situated on Callao Bay, seven miles west of Lima, with which it is connected by rail (Map: Peru, B 6). The modern city, a short distance to the north of the original town, which was destroyed in 1746, is divided into two sections, the older occupying the centre and having, to a great extent, narrow and crooked streets, while the surrounding portion is well laid out with broad avenues crossing at right angles. The buildings of the city are not particularly notable from an architectural standpoint. Callao enjoys a healthful, temperate climate. The harbor, though an open roadstead, is safe and spacious, being protected by the natural breakwater afforded by the island of San Lorenzo. It is fortified, and possesses splendid docking and ship-repairing facilities, which include a floating dock, 300 feet in length. Railway lines approach the docks. Callao has manufactures of refined sugar, lumber, and iron; but is more important as a commercial centre, its exports comprising minerals, sugar, hides, wool, bone, cotton, cocoa, etc., and the chief imports, manufactured articles, coal, and beer. The commerce has shown a considerable decrease since the decline of the guano trade. In 1900 nearly 1000 vessels (of over 50 tons), aggregating 1,315,000 tons, entered and cleared at the port of Callao. Population, in 1896, 48,118.

Callao figures in history from the times of the early Spanish conquest. It was considered a fair prize by the pirates who infested the western coast of America in the Sixteenth Century and later, and by them was attacked several times. By 1671 it had become of sufficient importance to merit the dignity of a city. An earthquake of 1687 was followed by the more disastrous commotion of 1746, which, with the accompanying tidal wave, destroyed the city and occasioned great loss of life. About the middle of the Eighteenth Century Callao was strongly fortified, San Felipe Castle playing a prominent part in subsequent wars. In 1826 the Spanish were driven from the city, their last foothold in continental America. Callao was bombarded by a Spanish fleet in 1866, and in 1880 by the Chileans, into whose power it fell the next year, after the battle of Miraflores. The treaty of 1883 restored it to Peru.

CALLAWAY, kăl'á-wā, SAMUEL RODGER (1850-1904). An American railway president, born in Toronto, Canada. In 1864 he entered the service of the Grand Trunk Railway, in 1875 rose to be superintendent of the Detroit and Milwaukee Railway, and 1880 became manager of the Chicago and Grand Trunk. He was vice-president of the Union Pacific from 1884 to 1887; president of the Toledo, Saint Louis and Kansas City line in 1887-95; and of the New York, Chicago and Saint Louis in 1895-97. He was subsequently president of the Lake Shore and Michigan Southern, from 1897 to 1898, and of the New York Central and Hudson River Railway from 1898 to 1901, and in 1901 was chosen president of the American Locomotive Company.

CALLCOTT, kạl′kot, Sir AUGUSTUS WALL (1779-1844). An English landscape painter, born in London. He studied at the Royal Academy, and first devoted himself to portrait painting. After 1807 he exhibited nothing but landscapes for many years. In 1810 he was made a member of the Royal Academy, was knighted in 1837, and in 1844 was made conservator of royal pictures. His landscapes are remarkable for their beauty, clear definition of objects, good drawing, and truthful natural coloring. He has been called the English Claude. Among his pictures are: "Entrance to the Pool of London" (1816); "The Mouth of the Tyne" (1820); and among his figure paintings, "Milton Dictating to His Daughters" (1840) is noteworthy.

CALL′COTT, JOHN WALL (1766-1821). An English composer, born in Kensington. Too nervous to be a surgeon, as he had intended, he devoted his attention to music, and in 1785 won three of the four gold medals annually given by the Catch Club, the admired "O Sovereign of the Willing Soul" being one of the successful pieces. During the next ten years he obtained twenty of the medals given by the same society. In 1784 he was made bachelor, and afterwards (1800) doctor of music at Oxford. He studied composition with Haydn in 1790. In 1797 he issued a prospectus of an exhaustive musical dictionary, but because of his poor health could not undertake the work itself. In 1806 he published his *Musical Grammar;* in the following year his mind gave way under the continuous strain to which it had been subjected. He recovered again, but only for three years, when he relapsed, and continued insane until his death. He was one of the most eminent composers belonging to the British school of music, and especially celebrated for his glee compositions. His choicest productions were published in two volumes by his son-in-law, Mr. Horsley, in 1824.

CALL DUCK. A small beautiful breed of domestic ducks, bred in a gray and in a white variety, mainly for show purposes. The object is to make them as small and beautiful as possible. See DUCK.

CALLEJA DEL REY, käl-lā′hȧ dĕl rā′ē, FELIX MARIA, CONDE DE CALDERÓN (1750-1820). A Spanish general, born at Medina del Campo. He was sent to Mexico and after Hidalgo revolted defeated him near Guadalajara in 1811. In 1812 he captured the fortress of Guanajuato and murdered the revolutionists. A little later he captured Hidalgo's successor, Father Morelos, who was shot. For his cruelty in these operations Calleja was called 'the Butcher.' He was viceroy of Mexico in 1813-16, and was later ennobled. In 1819 he was selected to conduct the expedition against the Independents of Paraguay, was taken prisoner, and died soon after his release.

CALLET, kȧ′lā′, ANTOINE FRANÇOIS (1741-1823). A French historical and portrait painter. He was born in Paris, where he obtained the first prize, in 1764, for his "Biton and Cleobis," afterwards exhibited at the Ecole des Beaux-Arts. He became a member of the Academy in 1780, soon after he had painted the fresco, "Spring," for the Apollo Gallery in the Louvre. He painted portraits of Comte d'Artois, Louis XVI., Louis XVIII., and his other works include: "Winter, or Saturnalia" (1783); "Autumn, or Fête of Bacchus" (1787); "Summer, or Fête of Ceres" (1789); "Spring, or Worship of Juno Lucina" (1791)—all of which are in the Louvre.

CAL′LIAS (Gk. Καλλίας, *Kallias*). (1) The son of Phænippus, and one of a noble and wealthy Athenian family, the members of which were hereditary torchbearers at the Eleusinian Mysteries. He was an opponent of Pisistratus, and a successful contestant in the Olympic and Pythian games. (2) The son of Hipponicus and grandson of the preceding. He was present, dressed in his priestly robes, at the battle of Marathon. He is said to have been sent, in B.C. 449, as an ambassador of Athens to Artaxerxes, and to have negotiated a treaty most unfavorable to the Persians. On his return he was impeached for having taken bribes, and fined 50 talents. (3) The son of Hipponicus and grandson of the preceding, notorious for his extravagances and profligacy. In B.C. 392 he served at Corinth, on the occasion of the defeat of the Spartan *mora* by Iphicrates, and was one of the envoys empowered to negotiate peace with Sparta, in B.C. 371. The scene of Xenophon's *Symposium*, as well as that of Plato's *Protagoras*, is laid at his house. He died in poverty.

CALLIC′RATES (Gk. Καλλικράτης, *Kallikratēs*). A Greek architect of the Fifth Century B.C., who, together with Ictinus, built the Parthenon on the Acropolis at Athens.

CAL′LICRAT′IDAS (Gk. Καλλικρατίδας, *Kallikratidas*). A Spartan, the successor of Lysander in command of the Lacedæmonian fleet against the Athenians (B.C. 406). After defeating Conon in the harbor of Mitylene, and taking thirty of his ships, and subsequently capturing the fleet of Diomedon, he was defeated, and perished by drowning in the battle of Arginusæ. When Callicratidas took command of the Lacedæmonian fleet, he was greatly hampered by the impediments thrown in his way by his predecessor. He overcame these, however, and proved himself a man of vigorous character and genuine Pan-Hellenic feeling.

CALLIÈRES BONNEVUE, kȧ′lyâr′ bŭn′vụ′, LOUIS HECTOR, Chevalier de (1639-1703). A French army officer. He was Governor of Montreal in 1684, and in 1687 was leader of a part of the French and Indian forces which invaded the territory of the Five Nations in New York. He visited France to urge the seizure of New York as necessary to maintain French supremacy in Canada. In 1699 he was made Governor-General of Canada.

CALLIM′ACHUS (Gk. Καλλίμαχος, *Kallimachos*). An Athenian artist who lived near the close of the Fifth Century B.C. He made a famous gold lamp, which burned night and day in the temple of Athena Polias, on the Athenian Acropolis. He is also said to have originated the Corinthian capital. His sculptures were marked by exceeding delicacy and refinement of execution, and there is reason to believe that he was a follower of Calamis, and the first of the archaistic artists. Consult Furtwängler, *Meisterwerke der griech. Plastik* (Leipzig, 1893).

CALLIMACHUS (c.310-240 B.C.). A celebrated Alexandrine poet and grammarian. He was born in Cyrene, of a distinguished family, which traced its ancestry to Battus, the founder of that city. With Aratus of Soli he studied at Athens, and then began teaching at Alexandria, where he enjoyed the favor of Ptolemy Philadelphus and his successor, Ptolemy Euergetes. About B.C. 260 he was appointed librarian, and held the office for some twenty years. By his teaching and writing Callimachus exerted a great influence on his time. Among his pupils were some of the most celebrated scholars of the day—Eratosthenes, Aristophanes of Byzantium, Apollonius of Rhodes, and others.

According to Suidas, he left behind him over 800 books. Of his learned works in prose, the most important were his *Tablets* (Πίνακες, *Pinakes*), in 120 books. This was a great catalogue of the works contained in the library, the authors arranged according to subject matter and date, with brief observations on the size and genuineness of the works. Through this Callimachus became the founder of the critical study of Greek literature. We know, also, of a collection of glosses, of *Memorabilia* (Ὑπομνήματα, *Hypomnēmata*), and other minor works. As a poet he won chief distinction through his elegies, so that Quintilian calls him *elegiæ principem.* His strength lay, however, in his art and learning, not in poetic genius. As an illustration of his learning may be named his four books of *Causes* (Αἴτια), in elegiac measure, which treated of the founding of cities, the origin of ceremonies, etc. One of the most famous of his elegies was *Berenice's Lock* (*Coma Berenices*), written B.C. 246, in honor of Queen Berenice, and preserved to us in Catullus's translation, No. 66. Ovid also imitated his *Ibis*, in which he had attacked his rival, Apollonius Rhodius. Famous, also, in antiquity, was his idyllic poem *Hecate*, reminiscences of which are preserved in Ovid's story of Philemon and Baucis (*Met.* 8, 610ff.). Some verses of this have recently been recovered from a wood tablet found in Egypt. There are extant in a complete state only six hymns, one of which is in elegiac form, and sixty-four epigrams. These are best edited by Meineke (Berlin, 1861) and Wilamowitz (Berlin, 1882). For the newly discovered verses of the *Hecate*, consult: Gomperz, *Aus der Hekate des Kallimachos* (Vienna, 1893); *Sammlung Papyrus Erzherzog Rainer*, Vol. VI.

CALLING THE DIET. The term used in the Scotch criminal law as equivalent to arraignment (q.v.), although the forms are different from those followed in an arraignment. In Scotland, excepting in cases of high treason, there is no indictment by grand jury, but all prosecutions for the public interest before the High Court of Justiciary, and before the sheriff's court, where the sheriff is sitting with a jury, now proceed on indictment in the name of the lord advocate. Before a prisoner can be tried the charge preferred against him must have been served fifteen days before the trial, with a list of witnesses to be examined against him, and also of the jury panel. He is therefore presumed to know the nature of the charge against him; but if it be desired by him, or by his counsel, the clerk in the first instance reads the indictment aloud in open court, the same being a formal and orderly statement of the facts which the prosecutor is prepared to prove. The prisoner is then called upon to state his objections to the relevancy of the facts alleged, and is entitled to have the question of the sufficiency of the indictment disposed of by the court before being called on to plead to the facts. This is equivalent to the demurrer (q.v.) of the English and American criminal law. If the objection is sustained, the prosecution for the time fails, and the prisoner is sent back to jail to await another indictment, unless the prosecutor chooses to abandon the case against him altogether. See DIET; INDICTMENT; VERDICT.

CALLI′NUS (Gk. Καλλῖνος, *Kallinos*). A Greek poet, born at Ephesus, an elder contemporary of Archilochus. He lived in the first half of the Seventh Century B.C., and was the first to give Greek elegy a political turn. The remains of his verse urge his fellow-citizens to resist the attacks of the Cimmerians, and to fight bravely in the struggle with Magnesia. Fragments are collected in Bergk, *Poetæ Lyrici Græci*, II. (Leipzig, 1878).

CALLIOPE, kăl-lī′ô-pē (Gk. Καλλιόπη, *Kalliopē*, the sweet-voiced). One of the Muses (q.v.). When special functions were assigned to individual Muses, Calliope was placed over poetry, and in the later schemes she is the presiding goddess of epic poetry. In the later art she is represented with tablets or a roll. In some of the mythographers Calliope appears as the mother of Orpheus or of Linus.

CALLIOPE HUMMER. A humming-bird (*Stellula Calliope*) of the United States west of the Rocky Mountains. The male is metallic green above and whitish below, with reddish flanks, and the short tail dusky; his gorget is white, the feathers tipped with metallic purplish. It is numerous and makes its nest upon pine branches near cones, which it is made to resemble. For many interesting facts and pictures illustrative of this bird and its nidification, consult Ridgway, *The Humming-Birds* (Smithsonian Institution, Washington, 1892). See Plate of HUMMING-BIRDS.

CALLIP′PUS, or **CALIP′PUS**, OF CYZICUS (Gk. Κάλλιππος, *Kallippos*). An astronomer of the Fourth Century B.C. He discovered the error in the Metonic Cycle (q.v.) of 19 years, and substituted one of 76 years, which he supposed to equal 940 lunar months and 27,759 days.

CAL′LIPYG′OUS VENUS. A famous statue in the National Museum in Naples, so called from the part of her body at which she gazes. It was found in Rome, and is said to be the portrait of a hetæra.

CALLIRRHOË, kăl-lĭr′rô-ē (Gk. Καλλιῤῥόη, *Kallirrhoē*). A fountain in the bed of the Ilissus, near Athens. In early times the name seems to have been given to a fountain near the market-place, where the tyrant Pisistratus erected his Enneacrounos, or fountain with nine streams. From the fountain in the Ilissus was brought the water for the marriage bath. (2) The town of Edessa (q.v.) also was called Callirrhoë. (3) The wife of Alcmæon, who, yielding to her importunities, obtained from Phegeus the necklace of Harmonia and lost his life in the enterprise.

CAL′LISTE′IA. See GREEK FESTIVALS.

CALLIS'THENES (Gk. Καλλισθένης, *Kallisthenēs*) (c.360-328 B.C.). A Greek historian, born at Olynthus. He was a relative of Aristotle, by whom he was educated, in company with Alexander the Great. He lived for the greater part of his life at Athens, and devoted himself to the study of history. Having accompanied Alexander to the East, he incurred the latter's displeasure, and was put to death (B.C. 328), on a charge of treason. Callisthenes wrote several historical works, only fragments of which have come down to us. The work on Alexander ascribed to him is a composition of a much later date.

CALLIS'TO (Gk. Καλλιστώ, *Kallistō*). An Arcadian maiden, attendant upon Artemis, whose story was told with many variations by the Greek poets. Zeus won her love, but Artemis, discovering her condition while she was bathing, either transformed her into a bear or shot her. Her unborn child, Arcas, was saved by Hermes, at the command of Zeus, and gave his name to the Arcadians. The Alexandrian poet Callimachus seems to have been the first to tell how Zeus placed Callisto among the stars as the constellation of the Bear.

CALLIS'TRATUS (Gk. Καλλίστρατος, *Kallistratos*). A famous Athenian orator, born at Aphidnæ. When Athens, in B.C. 377, undertook to form a new Athenian League, he took an active part in the movement. In B.C. 371 he accompanied the Athenian envoys to Sparta, where he urged the cause of peace. In B.C. 362 or 361 he was condemned to death, probably chiefly in consequence of disasters which had befallen the Athenians at Oropus. He went into exile at Methone, on the Thermaic Gulf, but later returned to Athens and was put to death. Callistratus was the most famous orator of his time, and his harangue on the matter of Oropus is said to have produced a profound impression on Demosthenes, who, as a boy, was present at its delivery.

CALL OF THE HOUSE. In Great Britain a Parliamentary proceeding pursued as late as 1838, for the purpose of insuring a full attendance of either House on occasions of extraordinary importance. It was the custom to give notice in advance that such a call would be made, and on the appointed day all members, under pain of incurring the displeasure of the House, were expected to answer to their names as the roll was read off by counties and boroughs. In the United States a call of the House is moved by the opponent of a measure which is about to be passed, for the purpose of showing that a quorum is not present.

CALLOSITIES. See Corns.

CALLOT, kä'lō', Jacques (1592-1635). A French designer and engraver, born in Nancy. The family opposition to his pursuing the study of art only served as an incentive to his ambition, and after he had twice run away in order to study, and had been ignominiously brought home, he was at last permitted to go to Rome. He rose rapidly to prominence in his profession. The war scenes enacted in France at this time were portrayed by him with great vigor and freshness, in a series of pictures called "Misères et Malheurs de la Guerre." His reputation, however, rests on his etchings of genre pictures, which he treated with great originality, life, and humor. His observation was vivid and his inventive genius, with his other artistic qualities, made him preëminent in his line of work. He felt a dissatisfaction with his own productions which made him painstaking to a degree, and impelled him to draw and draw again the subject under consideration. He died March 16, 1635. He left about 1500 prints. A complete list of his works is given in M. Heineken's *Dictionnaire des artistes.*

CALL TO THE UNCONVERTED, The. See Baxter, Richard.

CALLU'NA. See Heath.

CAL'LUS (Lat. *callum*, *callus*, hardened skin, hard flesh). A term in surgery for the substance that forms between the ends of broken bones during the process of repair, to hold the fragments together. It consists of new or embryonic tissue, and a large part of it is absorbed after union is complete. When the ends of the broken bones are closely approximated there is only a small bridge of callus formed between them. When the ends of the broken bones move very freely upon one another and separate widely, a large cuff or flange of callus forms, encircling and immobilizing them as a splint would. Such an ensheathing mass of callus is sometimes known as a *temporary* or *provisional callus*, to distinguish it from that portion which lies directly between the apposed fragments of bone, and which in time becomes replaced by true bony tissue. When the amount of callus thrown out is excessive, permanent injury may result to adjacent structures if subsequent absorption is only partial. Nerves and tendons may be included in the callus, or a joint may be invaded and rendered useless. Surgical operation is sometimes necessary to remove this excess of callus and restore the parts to their normal condition.

In plants, callus is a tissue usually formed in consequence of injury to woody or herbaceous stems. See Anatomy of Plants.

CALMAR, käl'mär. See Kalmar.

CALMET, kål'mâ', Augustin (1672-1757). A French Benedictine, and exegetical and historical writer. He was born at Mesnil-la-Horgne, near Commercy, February 26, 1672, and in 1689 entered the Order of Benedictines. In 1698 he was appointed teacher of philosophy and theology in the abbey Moyen-Moutier; in 1704, subprior of a convent of learned monks at Münster, in Alsace; and in 1706 he went to Paris, to superintend the publication of his *Commentary on the Bible.* He was afterwards appointed prior at Lay (1715), abbot of Saint Leopold in Nancy (1718), abbot of Senones in Lorraine (1728), and died in Paris, October 25, 1757. His exegetical writings have been commended and studied with advantage by both Roman Catholics and Protestants. The *Commentary on the Bible* (23 vols., Paris, 1707-16), though marred by the author's deficient knowledge of the Oriental languages, contains valuable researches in biblical antiquities. Calmet's *Historical and Critical Dictionary of the Bible* (4 vols., Paris, 1722-28) was translated into English, German, and other languages, and has passed through many editions. His other works—a *History of the Bible*, and of the *Jews* (1718), and a *Universal History* (1735-71)—are mere compilations; but his *History of Lor-*

raine (Nancy, 1728, 4 vols.; 2d ed. 1745-47, 6 vols.) is founded on original researches. Solid criticism and independent judgment are wanting in all his works. For his life, consult: Fangé (Senones, 1762); A. Digot (Nancy, 1861); and on his correspondence, P. E. Guillaume (Nancy, 1875).

CALM LATITUDES. The portion of the ocean which lies between the northern and southern trades, and where calms of long duration are likely to prevail. They vary with the season of the year and the consequent shifting of the trade-wind belts. The term is also applied to the region along the polar edge of the trade-wind belts, which is called the Horse Latitudes. See Doldrums.

CALMON, kȧl'môɴ', Marc Antoine (1815-1890). A French statesman. He was born in Tamniès (Dordogne), and studied law in Paris. In 1871 he became Under-Secretary of State in the Department of the Interior, and in December, 1872, he was appointed prefect of the Department of the Seine, which position he held until the downfall of the Thiers Ministry. In 1873 he was elected to the National Assembly. His valuable works on political economy include the following: *Les impôts avant 1789* (1865); *William Pitt, étude financière et parlementaire* (1865); *Histoire parlementaire des finances de la Restauration* (1868-70); *Etude des finances de l'Angleterre depuis la réforme de Robert Peel, jusqu'en 1869* (1870). He also edited Thiers's *Discours parlementaires* (15 vol., Paris, 1879-83).

CALOMARDE, kȧ'lō-mär'dȧ, Francisco Tadeo, Count (1775-1842). A Spanish statesman. He was born at Villel, in Aragon, studied in Saragossa, and became an advocate. During the wars of Napoleon he remained loyal to the national cause, and after the expulsion of the French and the return of Ferdinand VII. in 1814, Calomarde was among the first to hurry to Aragon and do homage to him as absolute monarch. As a reward of his obsequious celerity he obtained a post in the Council for the Indies, but lost it on account of accepting a bribe. On the restoration of the Constitution in 1820 he unsuccessfully courted the favor of the Liberals; but when the French Army in 1823 restored the authority of Ferdinand VII. Calomarde was appointed secretary of the *cámara del real patronato*, one of the most influential offices in the kingdom. Not long after the King made him Minister of Justice. While he held this office he showed himself an uncompromising enemy of free thought and progress, and a friend of the old ecclesiastical supremacy. He also secretly favored the party of Don Carlos, but by treating any unseasonable outbreak with great cruelty he preserved himself from the suspicion of being implicated in Carlist schemes. In 1832, when Ferdinand was supposed to be on his death-bed, he was prevailed on by Calomarde to reintroduce the Salic law, by which the Infanta Isabella was excluded from the throne, and Don Carlos, the favorite of the Absolutists, was appointed successor. The unexpected recovery of the King frustrated Calomarde's schemes, and he fled in disgrace to France. He died in Toulouse. Consult Cardenas, *Vida de Calomarde* (Madrid, 1841-49).

CAL'OMEL (Gk. καλός, *kalos*, beautiful + μέλας, *melas*, black: so called because white, though prepared from black substance). The popular name given to one of the compounds of mercury and chlorine, and known as the subchloride or mild chloride of mercury, with the symbol Hg_2Cl_2. It is a heavy, white, tasteless and odorless powder, insoluble in water, ether or alcohol. It is used in medicine principally to stimulate the flow of bile in the case of a sluggish liver, or to unload the intestines (with the help of a saline cathartic), or to carry off fermenting substances in the digestive tract. It is a valuable adjunct to quinine in malarial fever. The medicinal dose of calomel is from one-half a grain to ten grains. Excessive doses, or the retention in the system of one large dose, cause swelling of the tongue and gums, and salivation. See Mercury.

CALONNE, kȧ'lŭn', Charles Alexandre de (1734-1802). French Minister of Finance under Louis XVI. He was born January 20, 1734, in Douai. As advocate-general, procurator-general and intendant, he had displayed many brilliant but unsubstantial qualities, when, in 1783, at the instance of his patron, Comte d'Artois, and Marie Antoinette, he was summoned by the King to become Comptroller-General of the Finances. The treasury then was in hopeless disorder, and the whole financial system of the kingdom was inadequate to meet the demands of the extravagant Court and administration. Calonne's policy, whereby he hoped to give satisfaction where the others had not, is best exhibited in his own words: "A man who wishes to borrow money must appear to be rich, and in order to appear rich it is necessary to make a display of expenditure. Economy is doubly fatal; it warns the capitalists not to lend to a treasury involved in debt; it causes the arts to languish, while prodigality enriches them." Thus he won the enthusiastic admiration of the Court, by actually encouraging that extravagance which he regarded as necessary to bolster up credit. When the Queen came to him for an unusually large sum of money, he is said to have replied: "What you wish, madame, shall be done, if it is possible; and if it is not possible—it shall still be done!" But Calonne soon found that public credit requires some more substantial foundation than mere display. Both credit and taxation had reached their absolute limits. A crisis had arrived, with which neither Minister nor King could deal. An Assembly of Notables was therefore called and Calonne opened its session in February, 1787, with a glowing account of the national prosperity, but urged the necessity of certain reforms in taxation. The Notables required an account, which revealed his mismanagement, and he was dismissed and exiled. He died in 1802. Consult the authorities referred to under France for this period.

CAL'OPHYL'LUM (Neo-Lat., from Gk. καλός, *kalos*, beautiful + φύλλον, *phyllon*, leaf). A genus of trees of the order Guttiferæ, natives of warm climates. Some of the species yield valuable timber, as the piney-tree (*Calophyllum angustifolium*), which grows at Penang and in the islands to the eastward of the Bay of Bengal, attaining large proportions in ravines and narrow, moist valleys, and furnishes the beautiful straight spars called 'Poon.' The resinous products of some species are valuable, and among them are some of the substances known by the name of Tacamahaca. *Calophyllum inophyllum* is a very large and beautiful umbrageous tree, often planted for its shade and the fragrance of its flowers, which are white and in loose axillary racemes. It is one of the most valuable timber-trees of the South Sea Islands. The timber resembles mahogany, being of equally close texture, although of lighter color, and very durable. The leaves are oblong and obtuse: the fruit is a globose drupe or stone-fruit, about the size of a walnut, and a fixed oil is expressed from its kernel, which is used for lamps, etc. In the Hawaiian Islands this oil is extensively applied to bruises and in rheumatism. A similar oil is expressed from the seed of *Calophyllum calaba*, a native of Ceylon, which also has white sweet-scented flowers, and whose timber is used for various purposes, particularly for staves, cask-headings, and house-building. Considerable difference of opinion exists as to the species producing the Tacamahaca resin and the Poon spars. The more recent authors state that *Calophyllum calaba* yields the true Tacamahaca and *Calophyllum inophyllum* a resin quite similar. Doubtless several species furnish the Poon Spars. There are a number of other species, some of which yield heavy, durable timber that is valuable for engineering purposes.

CALOR'IC (Fr. *calorique*, from Lat. *calor*, heat). An early term for heat, when it was considered an invisible, imponderable fluid. See HEAT.

CALORIC ENGINE, or HOT-AIR ENGINE. An engine in which the pressure acting on the piston is produced by increasing the temperature of air through the application to it of heat by transfer through a separating metal wall. This definition distinguishes the hot-air engine from the compressed-air engine (see COMPRESSED-AIR ENGINE) on one hand, and the internal combustion engine (see GAS-ENGINE) on the other hand. There are, however, hot-air engines which employ both previous compression, and internal combustion. The action of hot-air engines, like that of all other heat-engines, consists in admitting the air at a high temperature and pressure, and by allowing it to perform work on the piston reducing its pressure and temperature, after which it is either exhausted into the atmosphere and a fresh supply is introduced, or else it is again heated for a repetition of the former process. In their principal working parts hot-air engines are very similar to ordinary steam-engines. The heated air is introduced into a cylinder in which works a tightly fitting piston, which is thus compelled to move up and down and transfer its motion to a revolving shaft by means of piston and connecting rods and the other usual mechanisms of steam-engines. (See STEAM-ENGINE.) Hot-air engines are of several types, which may be described and explained as follows: Closed-cycle engines are those which operate continuously with the same mass or weight of air, only taking in a fresh charge to replace leakage or to increase the mass in use. Open-cycle engines are those in which at each stroke a new charge is drawn in from the atmosphere, and after being heated and expanded is exhausted again into the atmosphere. Regenerative and non-regenerative engines are those which, respectively, use or do not use a regenerator to absorb the heat of the exhaust air and to restore it to the incoming cooler air. Finally, closed-cycle engines may be divided into two sub-classes, which differ by having the temperature change take place in the air at constant pressure or at constant volume. Each of these types is identified with the name of some designer or engineer. Hot-air engines have been designed in great numbers, but the limited extent to which they have been used makes most of them but little more than names. The hot-air engine as defined at the beginning of this article seems to have been invented by the Rev. Robert Stirling, an Englishman, in 1816. His first successful engine was built in 1827, and one afterwards was used in a foundry in Dundee, Scotland, developing 20 brake horse-power on the consumption of 50 pounds of coal per hour. In this engine, shown diagrammatically in Fig. 1, the same volume of air was alternately heated and cooled, producing a variation of pressure which actuated a working piston. The heating and cooling were effected by changing the air by means of a plunger, *D*, from end to end of a cylinder, *A*, one end of which was kept hot by a fire and the other cool by a coil of water-pipe, *C*. On its way from end to end the air passed through a passage partly filled with thin plates of metal, *E*, which alternately absorbed the heat from the air and gave it back on the return. This was the first application of the economizer or regenerator, and its invention is said to be due to James Stirling, a civil engineer. This engine failed through the giving out of the heaters, which required to be kept red-hot. In 1844 Franchot, a Frenchman, patented an arrangement of the Stirling engine with large and efficient heating and cooling surfaces. Further attempts at improvement were made by Rankine and Napier, and by Professor Jenkin in England, and also by Lauberau in France. The Stirling engine belongs to the type of hot-air engines with temperature changes at constant volumes. Another hot-air engine which has much the same classic and historical interest as the Stirling engine is that invented by John

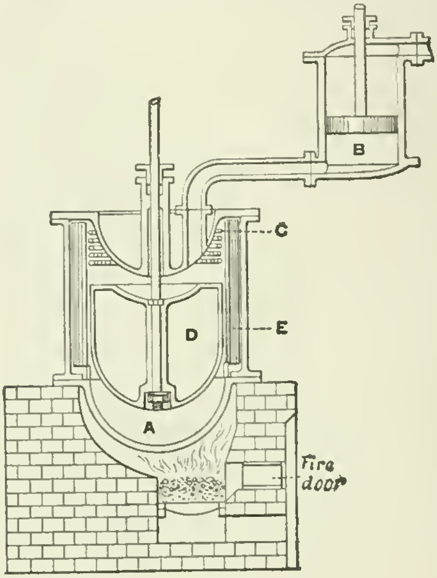


FIG. 1. STIRLING HOT-AIR ENGINE.

Ericsson (q.v.). The engines of Ericsson differed from the Stirling engine in that they drew their supply of air from the atmosphere at each stroke, heated it, allowed it to expand while doing work, then exhausted it again into the external air; they belonged to the type of hot-air engine with temperature changes at constant pressure. The first engine was installed in the ship *Ericsson* in 1852, but the idea dates from 1833, and it enjoys the distinction of having been built on the largest scale and of having made the most noted failure of any hot-air engine. To Ericsson is to be credited also the term 'caloric engine,' which he applied as a sort of trade name to his invention. Briefly described, Ericsson's first engine was designed for a 2200-ton seagoing ship; it was intended for 600 horsepower, but actually ran at about 300 horsepower. There were four cylinders, each 14 feet in diameter and having 6 feet stroke, and the engine ran at nine revolutions per minute. As stated above, the engine proved a failure after several attempts had been made to remedy its faults. First the 14-foot cylinders were removed and replaced by others, which also failed; and finally the engine was replaced entirely by a steam-engine. Afterwards Ericsson made another attempt to drive a ship by an air-engine. The *Primera* was built and fitted with horizontal engines drawing their supply from, and exhausting into, an artificial atmosphere of high pressure. As in the former attempt, however, the heating surface proved inadequate and the available pressure was too small to give much power, so that again steam was substituted after a short trial. Economizers were employed with both of his large engines, but in the small engines, to the design of which Ericsson turned his attention after the failure of his large motors, the economizer was abandoned. Ericsson's first design for a small motor was brought out in 1860, and in 1880 the latest form for pumping purposes was produced. Fig. 2 shows this type of engine.

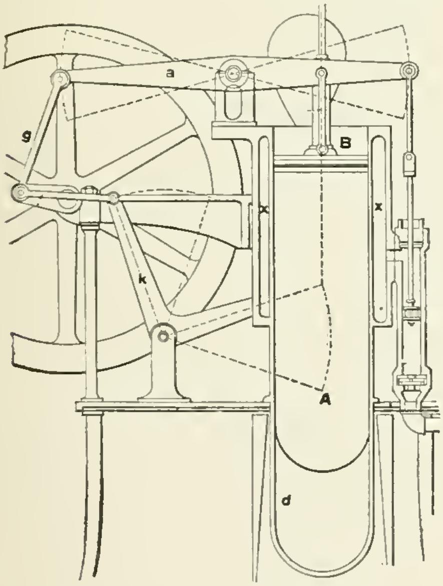


FIG. 2. ERICSSON CALORIC ENGINE.

The fire of coal or gas is below the cylinder *d*, which is water-jacketed at the upper end, *x x*. In tank pumping engines, the pumped water circulates through the water-jacket. At *A* is the hollow displacing piston, and *B* is the working piston proper. The displacer is coupled to the bell crank *k*, and so to the crank *c*, to which the beam *a* is linked directly by *g*. These engines do not use less fuel than steam-engines of similar size, but as they require no water or licensed engineer, they have come into considerable use.

The Stirling engine and the Ericsson engine between themselves embodied all the characteristic features of the several types of hot-air engines defined above. The Ericsson engine is an open-cycle, non-regenerating engine, with temperature changes at constant pressure; the Stirling engine was a closed-cycle, regenerating engine, with temperature changes at constant volume. The hot-air engines produced by other inventors of this kind of prime motor have resembled sometimes the Ericsson engine and sometimes the Stirling engine, but have had the details of operation worked out in different ways. Two of these only need be mentioned for the purpose of illustration: The Wilcox engine, of which large numbers were made about 1860 to 1865, was, like the Ericsson ship engine, an open-cycle, regenerative engine, with temperature changes at constant pressure. Its distinctive characteristic was a peculiar supply cylinder fitted with a piston operated from the main shaft. This supply cylinder took in the atmospheric air and passed it through the regenerator to the operating cylinder, where it was heated and expanded to perform its work, after which it was exhausted through the regenerator into the external air. The Merrill engine, one of which of 10 horsepower was used for some years previous to 1885 to run a factory at Winchendon, Mass., worked on the same principle as the Stirling engine; that is, it used the same volume of air over and over. It had two working cylinders, each of which was double-acting (see STEAM-ENGINE), and two reverser plungers, which affected the transfer of the air between the heating and cooling devices.

Mention was made at the beginning of this article of hot-air engines employing previously compressed air. These are commonly known as compression engines. In them a constant quantity of air is constantly changed in volume, being compressed while cold and expanded while hot. There are usually two cylinders, one cold and kept cold by a water-jacket or other means, and the other hot and kept heated by external means. The piston in the hot cylinder is generally timed from one-sixth to one-quarter revolution in advance of that in the cold cylinder, whereby the air is first changed into the cold cylinder, sometimes through a regenerator, then compressed therein, then changed to the hot cylinder back through the regenerator, taking up again the stored heat, and finally expanded in the hot cylinder. The first engine of this kind seems to have been invented by Charles Louis Felix Franchot, a Frenchman, in 1853, and it is deserving of brief mention for the clear manner in which it illustrates the working principle. Hot and cold cylinders of different areas were placed side by side, as shown by Fig. 3, with their pistons connected to cranks 135° apart. The bottom of the cold cylinder, *A*, was connected to the top of the hot cylinder, *B*, and vice versa through heating and cooling chambers, *C* and *D*, containing Stirling regenerators. The arrangement of the pistons was such that the air was compressed in the cool cylinder; passed through the regenerator into the hot cylinder, where it was expanded; then transferred to the cold cylinder through the cooling chamber, and the cycle repeated. From four to six cylinders, each double-acting, were proposed to be combined in a series. A model of one of these engines was exhibited at the Paris Exposition of 1855. This same principle was embodied in an engine patented by the famous engineer Sir William Siemens, in 1860, but he neglected to put it into practical use. The Siemens engine employed four cylinders, each hot at one end and cold at the other, all connected to one shaft, and so arranged that the hot end of one communicated through a regenerator with the cold end of the next. The heat was supplied by hot products of combustion from producer gas in a chamber connected with the hot ends of the cylinders, while the opposite ends were fitted with refrigerating devices. One of the latest forms of compression engines is the Rider, shown by Fig. 4. In this sectional view *C* is the cold cylinder or compression cylinder, surrounded by the water-jacket, *E*, and *D* is the hot cylinder. The compressed air from the cold cylinder is changed through the regenerator, *H*, to the hot cylinder, where it is expanded by the heat from the grate underneath the cylinder.

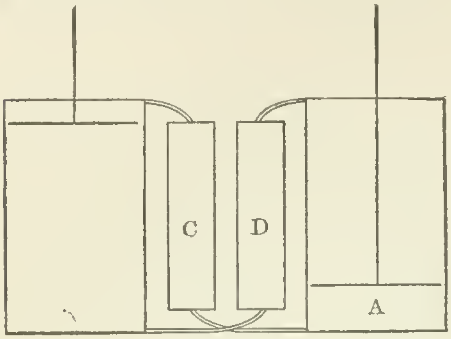


FIG. 3.

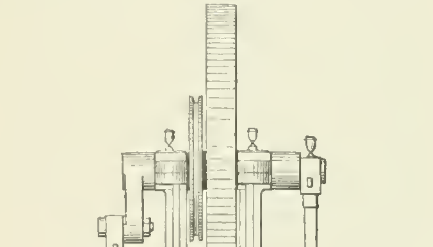


FIG. 4. RIDER CALORIC ENGINE.

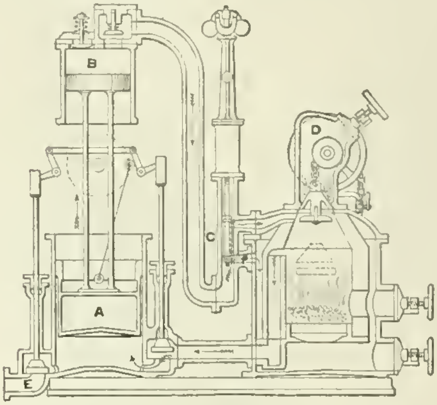


FIG. 5. HOT-AIR PRODUCT OF COMBUSTION ENGINE.

Hot-air engines employing internal combustion, like compression engines, form a separate class of this type of motor. At the outset of their consideration, however, it is important to note a somewhat arbitrary distinction between them and the internal combustion motors known as gas-engines. The true gas-engine is limited generally to internal-combustion engines, in which the air, mixed with gas or with oil-vapor, is admitted to the cylinder and ignited after its admission. Liquid or gaseous fuels are essential in this type of engine. Hot-air internal-combustion engines, or, more properly, hot-air products of combustion engines, operate by forcing atmospheric air through a closed fire, which may be and generally is a solid fuel fire, and carrying the air and gases of combustion to the engine cylinder. One form of such air-engines is shown by Fig. 5. The furnace was placed in a chamber strong enough to withstand the pressure. The compressing pump *B* forced air below the ash-pit up through the fire, where it was expanded by heat and by combustion with carbon. Being admitted to the working cylinder against the piston, it was exhausted into the chimney. The furnace had to be charged with fresh fuel through a combination of double doors, *D*, working on the principle of an air-lock. A hot-air product of combustion engine was described by Sir George Cayley, an Englishman, in 1807 and 1825, and again in 1837 this inventor patented a modification of the same design and built several engines, none of which gave any marked success. In 1821 Dr. Neil Arnott (q.v.), the celebrated scientist, took up the same idea and patented a form of engine in which, to avoid the abrading action of the ashes on metal pistons and cylinders, he used oil pistons. Following Cayley and Arnott, a number of inventors worked on the idea, among them being the Americans Stephen Wilcox, S. H. Roper, and Philander Shaw, each of whom built and sold a number of engines. Broadly speaking, the difficulties of operating these engines were so great that they recorded a general failure. These difficulties were caused by flue-dust and the grit in the cylinders, the rapid destruction of the working surfaces and valves by the intense heat, and the practical impossibility of lubrication. They were also more bulky than other types of hot-air engines in proportion to the power developed.

The possibilities of the hot-air engine as a competitor of the steam-engine are often urged, but so far it has never reached any practical success which warranted much hope that the competition would prove serious. The two sides of the question are fairly and concisely summarized by Prof. F. R. Hutton as follows:

"The hot-air engine in small sizes is more economical than the steam-engine of the same capacity. In larger sizes it has about the same economy as the less economical steam-engine, measured in coal consumed per horse-power. It has the advantage of avoiding the steam-boiler as a magazine or reservoir of energy which may be liberated by accident so suddenly as to be explosive. It can be run by less skilled and expensive labor, and no steam-runner's license is demanded. It is safe and odorless. The objections to the hot-air engine are the greater bulk and greater weight for the same power than is required with the steam-engine; the low mean pressure with high initial pressure, which latter compels great strength of structure; the deterioration of heating surfaces exposed to high heats and consequent oxidation: the difficulties of packing and lubricating at high temperatures; the difficulty of regulation closely to varying resistances. If there is any danger to the present supremacy of the steam-engine, it will be in relatively small plants that a hot-air engine can be a substitute; the gas or internal-combustion engine is more to be feared than the hot-air engine proper."

A theoretical and practical discussion of hot-air engines and heat-engines generally is contained in Hutton, *Heat and Heat-Engines* (New York, 1899).

CAL'ORIM'ETRY (from Lat. *calor*, heat + Gk. *μέτρον*, *metron*, measure). The science of the measurement of quantities of energy when manifested by heat effects. By the name 'heat effects' is meant the changes produced in material bodies when they are exposed to what is called a 'source of heat,' e.g. a flame or the rays of the sun. Among these changes which may take place are expansion, fusion, evaporation, alteration in electrical and magnetic properties, etc. It is now believed that these changes are occasioned by increase in the energy of the smallest portions of the bodies. When a body is 'heated' or 'warmed,' we mean that its minute parts gain energy; and opposite changes, e.g. freezing, condensation, cooling, etc., take place when these parts lose energy. It is the province of calorimetry to measure these amounts of energy gained or lost. The *erg* (see MECHANICAL UNITS) is the unit of energy and work, and therefore all quantities of energy should be measured in terms of it; but it rarely happens that heat effects are due directly to mechanical work except in case of friction. Consequently the erg is not a convenient unit. Heat effects and the energy required to produce them are almost invariably compared with one definite heat effect, viz. rise in temperature of water; and the practical unit employed for measuring thermal energy may be defined as the quantity of energy required to raise the temperature of one gram of water from 15° to 16° C. on the thermometric scale of the constant-pressure hydrogen thermometer. (Other definitions of a practical unit have been proposed, e.g. by the substitution of 20° to 21° in place of 15° to 16° C.; or the one-hundredth portion of the quantity of energy required to raise the temperature of one gram of water from the freezing-point to the boiling-point under normal pressure.) This practical unit is called the *calorie*, and its value is very nearly 4.187 joules, or 4.187×10^7 ergs. See HEAT.

By the 'specific heat' of a substance at a given temperature and under definite conditions is meant the number of calories required to raise the temperature of one gram of the substance one degree by the hydrogen scale (see THERMOMETER), at that temperature, and under those conditions. By the 'latent heat' of a substance for a definite change of state (e.g. fusion, evaporation, sublimation, dissociation), under definite conditions, is meant the number of calories required to produce the particular change of state in one gram of the substance under the specified conditions. Thus we speak of the 'specific heat of air at constant pressure,' or the 'latent heat of evaporation of water at normal atmospheric pressure.' In general, however, we can learn simply the *average specific heat*, i.e. the number of calories required to raise the temperature of one gram through t degrees, divided by t. Calorimetry is, then, chiefly, the science of measuring specific and latent heats.

There are two general methods for the measurement of specific heats, which may be regarded as satisfactory—the method of mixtures and the use of an ice or a steam calorimeter. In the method of mixtures a known quantity of the substance at a known temperature is mixed with a known quantity of some liquid at a different known temperature and the temperature of the mixture is observed. The specific heat of the liquid for the given range of temperature being known, and allowance being made for losses by radiation and conduction, and for the calories spent in changing the temperature of the vessel containing the liquid, the specific heat of the substance may be at once deduced. The most improved form of apparatus for use in this method is that of Prof. T. A. Waterman, a full description of which is given in the *Physical Review*, Vol. IV., p. 161 (1896).

In the ice-calorimeter, the substance whose specific heat is desired is introduced into an apparatus which allows the heat energy withdrawn from the body to be spent entirely in melting ice. The change in temperature of the substance and the quantity of ice melted may be observed; and thus, assuming that the latent heat of ice is known, the specific heat of the substance may be calculated. This method is due to Black; and the most improved apparatus is that designed by the late Professor Bunsen, of Heidelberg. The most accurate method of using the 'Bunsen calorimeter' is that of Dr. Dieterici, of Hanover. (See *Wiedemann's Annalen der Physik und der Chemie*, Vol. XXXVII., p. 494, 1889.) Fairly satisfactory descriptions are given in almost all general text-books on physics. In the 'steam-calorimeter' the substance whose specific heat is desired is suspended on one pan of a chemical balance, which is inclosed in a box connected with a steam-boiler; if the steam is suddenly admitted, some of it will continue to condense on the pan and the substance until their temperature is raised to that of the steam. The quantity of steam thus condensed may be weighed by placing weights in the other pan of the balance, and, if the latent heat of condensation of steam is known, the specific heat may easily be calculated. This method is due to Professor Joly, of Dublin, and a full description of the latest improvements may be found in the *Philosophical Transactions of the Royal Society of London* (1894). In all these methods it should be noted that what is measured is the *average specific heat* of the substance over a given range of temperature. For other methods of measurement of specific heat, reference may be made to the larger treatises on physics.

To measure the latent heat of fusion two methods have been used successfully; one is an obvious application of the method of mixtures; the other is to secure the fusion by means of the heating action of an electric current, whose intensity and electromotive force may be measured, thus giving the quantity of energy consumed in producing the fusion.

To measure the latent heat of evaporation, two similar methods have been used, and a third also. If the vapor is conducted through a long spiral tube surrounded by water, the vapor will condense, the temperature of the water will be raised, and thus we have simply the method of mixtures. Or a liquid may be made to evaporate by means of a reduced pressure, and the consequent fall of temperature may be balanced by the heating action of a known electric current. Again, if a liquid inclosed in a Bunsen calorimeter is caused to evaporate, the surrounding water will be frozen—just the reverse of the general use of the apparatus—and the quantity frozen may be measured. For full description of these various methods for measuring latent heats of all kinds, reference should be made to general treatises on heat. Preston, *Theory of Heat* (London, 1894), is perhaps the best book of reference.

Another class of calorimeters is designed to enable the observer to ascertain the number of calories furnished when certain fuels, such as coals, oils, etc., are allowed to burn under definite conditions. In these the coal is placed in a hollow steel cylinder which can be tightly closed, oxygen is admitted under high pressure, and combustion is started by means of an electric current through a fuse wire. The cylinder is kept immersed in water, the rise of temperature of which is observed, and the energy generated thus measured. Calorimeters constructed on a large scale are used to measure the amount of heat given off by an animal or human being, the amount of food and air supplied to the subject of the test being recorded. Prof. W. O. Atwater, of Wesleyan University, has carried on a number of experiments with such an instrument, and has ascertained the fuel value of various foods. His results are to be found in a series of bulletins issued by the United States Department of Agriculture.

CALOTTISTES, kä'lô'têst' (Fr. *Calottiste*, from *calotte*, dimin. of OF. *calc*, cap.) A society of wits and satirists in the time of Louis XIV. and Louis XV., known as the *Régiment de la Calotte*. They were headed by two officers in the King's bodyguard, named Torsac and Aymond. Their amusement consisted in sending to any public character who had exposed himself to ridicule a 'patent' authorizing him to wear the *calotte* as a covering for the weak part of his head. The armorial bearings of the *Régiment de la Calotte* consisted of various symbols of folly, with the mottoes *C'est regner que de savoir rire*, and *Favet Momus, Luna Influit*. When Torsac, its first 'generalissimo,' died, the society, which occupied a position of satirical hostility to the French Academy, drew up a burlesque funeral oration, manufactured out of the pompously eulogistic phrases which the academicians were in the habit of using. As the society became more audacious and did not spare even royalty itself, it was dissolved by the Minister, Fleury. The *Mémoires pour servir à l'histoire de la Calotte* (Basel, 1725) is an amusing little book. During the Bourbon Restoration the title *Régime de la Calotte* was applied to the priestly administration of affairs.

CAL'OTYPE (Gk. καλός, *kalos*, beautiful, + τύπος, *typos*, impression). A name applied to one of the earliest processes for producing photographic prints, as well as to the prints themselves. The process was invented by Henry Fox Talbot in 1840. It consists of the following operations. A sheet of good plain paper with a smooth surface and a close and even texture, is washed by means of a soft brush with a solution of 100 grains of crystallized silver nitrate in 6 ounces of distilled water. The paper is allowed to dry in a dark room and is then dipped into a solution of potassium iodide made by dissolving 500 grains of that salt in a pint of water. After a few minutes it is removed and then dipped into water and dried. This 'iodized paper' is exceedingly sensitive to light, and may be kept for some time if it is carefully protected from sunlight. When required for use, a sheet of it is washed in a mixture which Mr. Talbot called gallo-nitrate of silver. The mixture is obtained by adding a saturated solution of gallic acid to an equal volume of a solution of 100 grains of crystallized silver nitrate in 2 ounces of distilled water, to which one-sixth of its volume of strong acetic acid had been added. After the iodized paper has been washed over with this solution it is dipped into water and then cautiously dried with blotting-paper. An exposure of less than a second in diffused daylight is sufficient to obtain an impression. In order to develop the impression the paper is again washed with gallo-nitrate of silver and dried near a fire, the exposed portions becoming brown, while the covered portions retain their original color. The picture is then fixed by consecutively washing it in clean water, drying, washing in a solution of potassium bromide (100 grains in 8 ounces of water), washing in water to remove any surplus iodide solution, and finally drying.

The calotype process has been superseded by other processes, and is at present hardly ever used. See PHOTOGRAPHY.

CALO′VIUS, ABRAHAM (1612-86). A German Lutheran theologian, whose real name was Kalau, born in Mohrungen, East Prussia. He became rector of the gymnasium in Danzig (1643) and later professor of theology in Wittenberg (1650). He was a strong polemical writer; his chief works were *Systema Locorum Theologicorum* (12 vols., 1665-77), and *Biblia Illustrata* (4 vols.).

CALPE, kăl′pê. One of the Pillars of Hercules, now the Rock of Gibraltar.

CALPEE, or **KALPI**, kạl′pê. A city in the Jalaun district of the Northwest Provinces of British India, on the right bank of the Jumna, in latitude 26° 7′ N. and longitude 79° 48′ E. (Map: India, C 3). Population, 12,700. It is an entrepôt for the rice and cotton of the neighboring district, and has manufactures of cotton, paper, and sugar. It is 51 miles southwest of Cawnpore, and is closely linked with it in the history of the great mutiny of 1857-58.

CALPUR′NIA. A character in Shakespeare's *Julius Cæsar*. The rôle is drawn after the historic daughter of Calpurnius Piso Cæsoninus, and last wife of Julius Cæsar. In the play she receives portents of the impending tragedy and tries to dissuade Cæsar from going to the Senate house.

CALPURNIA GENS. See CALPURNIUS.

CALPUR′NIUS. The Calpurnia gens was, by its own account, one of the oldest plebeian clans in Rome; but it does not figure in history till the time of the First Punic War. The family names, in the time of the Republic, were Bestia, Bibulus, Flamma, and Piso.—MARCUS CALPURNIUS BIBULUS is known as the hostile and incapable colleague of Cæsar (B.C. 59) in the consulate. He was put up by the aristocratic party, who spent vast sums to carry the election. He finally joined the Pompeian party, had command of the fleet intended to prevent Cæsar's passage to Greece, and died B.C. 48, before the battle of Dyrrhachium. Among the Roman women of this family, two are celebrated—CALPURNIA, the daughter of Calpurnius Piso (consul B.C. 58), and the last wife of Cæsar, who seems, from the scanty notices of her we possess, to have been a quiet domestic woman, full of love and solicitude for her great husband; and CALPURNIA, the daughter of L. Calpurnius Bestia, wife of P. Antistius, who killed herself when her husband was murdered by order of the younger Marius, B.C. 82.

CALPURNIUS, TITUS, surnamed SICULUS. A little-known pastoral poet of the reign of Nero (A.D. 54-68). He was the author of seven eclogues in close imitation of Vergil, but exaggerated and artificial. These have been edited by Schenkl (Leipzig, 1885) and Keene (London, 1887), and translated by Scott (London, 1890).

CALTAGIRONE, käl′tȧ-jê-rō′nȧ (from Ar. *Kalat-al-Girche*, fortress of Girche, a Saracen general, who captured the place in the Eighth Century). A city of Sicily, 57 miles southwest of Catania. It stands 2000 feet above the sea, on two steep hills that are connected by a bridge, has a magnificent prospect over fruitful fields in every direction, and is reputed the best built town in Sicily, having wide, well-paved streets. A stone stairway with 155 steps dating from 1506 leads from the spacious market-place up to the castle. The chief manufactures are those of terra-cotta figures, particularly of Sicilians and Calabrians in national costumes. Mosaics and vases, disclosed by excavating, point to an ancient town of unknown origin. Population (commune), in 1881, 32,000; in 1901, 44,879.

CALTANISSETTA, käl′tȧ-nê-sĕt′tȧ Ar. (*Kal-at-al-Nisa*, fortress of Nisa; Nisa was a Sicanian town). An episcopal city in the centre of Sicily, capital of the Province of Caltanissetta, situated on a hill 1930 feet above the sea, near the Salso, about 80 miles west of Catania, and southeast of Palermo (Map: Italy, J 10). The town has a castle, a cathedral with paintings of the later Sicilian school, public gardens with a picturesque prospect over mountain and valley, a seminary and a gymnasium, a school of technology and a school of mines, and a theatre. Two miles to the east is a beautiful Norman monastery erected in 1153 by Roger II., and 2 miles farther are a mud volcano resembling the Maccaluba (q.v., under ARAGONA) and an oil-well. The country has rich sulphur-mines, mineral springs, a lake full of fish, fields that fatten cattle and produce grain in abundance, and woods that contain much game. Population, in 1881 (commune), 30,000; in 1901, 43,300.

CAL′THA. See MARSH-MARIGOLD.

CALTON (kạl′ton) **HILL.** An elevation in the northeastern part of Edinburgh, overlooking the Forth. Three monuments surmount it, one in memory of Dugald Stewart, another in memory of Nelson, and a third in celebration of the battle of Waterloo.

CALUM′BA, or **COLOM′BA** (Neo-Lat., probably from Mozambique *Kalumb;* according to some, the name is derived from Colombo, in Ceylon). The root of *Jateorrhiza palmata*, a herbaceous plant of the natural order Menispermaceæ. The calumba now chiefly in use is produced in Mozambique. The flowers of the plant have 12 sepals and petals in all, similar in appearance, and disposed in four rows. The male and female flowers are on separate plants. The leaves are nearly circular, with five to seven lobes, on long hairy footstalks, and solitary axillary racemes of small green flowers, the racemes of the male plants branching. The fruit is a drupe, or one-seeded berry-like fruit, about the size of a hazelnut, densely clothed with long hairs. The stem is annual and twining; the root perennial, consisting of clustered, spindle-shaped, fleshy tubers, with a brown warty epidermis, internally deep-yellow, with a very bitter taste, and a faint aromatic odor. Its bitterness is ascribed to a somewhat narcotic principle called calumbine, and to berberine, an alkaloid originally discovered in the barberry. Calumba is regarded as one of the most useful stomachic tonics. As it contains no tannin, it may be taken with preparations of iron. It is well borne by the stomach, and is sometimes given to allay vomiting. It has been found useful in diarrhœa and dysentery. It is administered in the form of powder, fluid extract, or tincture. The very poisonous seed known by the name of Cocculus Indicus (q.v.) belongs to a plant of a different but allied genus. The root of *Frasera Walteri* is sometimes fraudulently substituted for calumba, and has been called American calumba-root. It does not agree with calumba in its properties, but besides its very different appearance, it may be distinguished by its undergoing no such change of color, when touched with tincture of iodine, as in true calumba-root is produced by the presence of starch. See FRASERA.

CAL'UMET. A village in Michigan. See LAURIUM.

CALUMET (Fr., Late Lat. *calamellus*, dim. of Lat. *calamus*, reed). The popular name for the Indian ceremonial pipe. The Indians had pipes of various shapes and sizes, made of clay, stone, or bone, but the ceremonial pipe was usually of large size, in the East and Southeast of white stone, and in the West of the red catlinite from the noted pipestone-quarry in Minnesota. The stem was made long, of wood or reed ornamented with feathers and porcupine quill-work. In the East the white pipe was sometimes made with from four to seven stem-holes around the bowl, so that as many persons might smoke at the same time. Native tobacco, mixed with willow-bark or sumac-leaves, was used. Although frequently referred to as the 'peace pipe,' the ceremonial pipe was in fact used in the ratification of all solemn engagements, both of war and of peace.

CALUMET.

CALUMPIT, kä'loom-pēt'. A town of Luzon, Philippines, in the Province of Bulacan. It is situated on the River Pampanga and is connected by rail with Manila. Population, in 1898, 15,000.

CALVADOS, käl'vȧ'dôs' (from Calvados, corruption of *Salvador*, the name of a vessel of the Great Armada, which was wrecked here). A northern maritime department of France, bounded north by the English Channel, and east and west and south by the departments of Eure, Manche, and Orne (Map: France, F 2). It is the most historical section of the old Province of Normandy. The principal rivers are the Orne, Dromme, and Vire. The coast is partly formed by bold ridges, cliffs, and reefs. The soil of the department is generally fertile, supplying rich pasturage for cattle, sheep, and horses, which, with swine, constitute the principal wealth of Calvados. The climate is healthful, though changeable. Iron, marble, slate, and coal are found. Area, 2132 square miles. Population, in 1896, 414,669; in 1901, 407,639. Capital, Caen.

CALVAERT, käl'värt, or **CALUWAERT**, DIONYSIUS (c.1540-1619). A Flemish historical and landscape painter (called in Italy DIONISIO FIAMMINGO, 'the Fleming'). He was born in Antwerp, and was registered as an art pupil there in 1556; but he soon went to Italy and studied under Prospero Fontana, and later under Sabbatini, assisting the latter in the Vatican. About 1574 he opened a school in Bologna, and had among his students the celebrated Domenichino, Guido Reni, and Albani. Many excellent pictures by him are still preserved in Bologna, where he died.

CALVARY. In Roman Catholic countries, a representation of the various scenes of the passion and crucifixion of our Lord, either in a chapel, or external to the church, as at Saint Jacques in Antwerp. It consists of three crosses with the figures of Christ and the thieves, usually as large as life, surrounded by a number of figures, representing the various personages who took part in the crucifixion. At Aix-la-Chapelle, the calvary is a church on the top of a hill, surrounded by twelve sculptured stones, each marking an event which took place on the journey of the Saviour to Mount Calvary. The approach to the calvary is called the *Via Dolorosa*, each of the stones marking what is called a station (see STATIONS), at which the pious say a prayer in passing.

CALVARY. An oratorio brought out at the Norwich festival in England in 1839. It was a translation of *Des Heilands letzte Stunden* (Cassel, 1835) by Spohr, who personally conducted the production.

CALVÉ, käl'vȧ', EMMA, stage name of EMMA DE ROQUER (1864—). A French dramatic soprano. She was born in Madrid of a Spanish father and a French mother, and was brought up in a convent school in the Department of Aveyron, southern France. She studied under Rosine Laborde, and made her début in *Faust*, at the La Monnaie, Brussels (1882). Though praised, she showed no trace of her now admired fiery temperament. She overexerted her voice, and, on Gevaert's advice, went to Marchesi, reappearing (in 1884) in Dubois's *Aben Hamet* at the Théâtre des Italiens, then directed by Maurel. Since then she has sung at the Opéra Comique, at the Grand Opera, in England, Italy, Spain, Russia, and the United States, making her début in New York on November 29, 1893. She has sung in David's *Lalla Rookh*, *Nozze di Figaro* (Countess and Cherubino), *Magic Flute* (Pamina), Widor's *Maître Ambrose*, *Pêcheurs de Perles*, *Carmen*, *Hamlet*, *Cavalleria Rusticana*, *Faust*, *Mefistofele*, *Pagliacci*, *L'Amico Fritz*. Besides, she created the leading parts in Joncières's *Chevalier Jean* (1885); Samara's *Flora Mirabilis* (1886); De Lara's *Messaline* (1900); Massenet's *Navarraise* (1895); and *Sapho* (1897), the last two written especially for her. She was ready to sing Elsa in French, when the Opéra Comique burned down (1887).

Calvé's voice is a rich soprano sfogato of 2½ octaves from *g* below the staff to a high e, perfectly even throughout, with a contralto-like low register. Her extraordinary dramatic powers have gained for her the title of the 'Singing Duse.' Her dazzling success as Carmen and Santuzza has led many to believe that she is mediocre as a singer pure and simple, with a small répertoire; but her technical virtuosity in Ophelia alone would place her among the greatest singers the world has known.

CALVERLEY, kăl'vēr-lĭ. The principal character in the pseudo-Shakespearian *Yorkshire Tragedy*. He is a dissolute fellow impoverished by gaming, whose maltreatment of his wife and children brings about the catastrophe of the play.

CALVERLEY, Charles Stuart (1831-84). An English humorist, born at Martley, Worcestershire. His father was the Rev. Henry Blayds, a name adopted near the first of the century, but in 1852 again changed to the ancestral Calverley. He was educated at Balliol College, Oxford, and at Christ's College, Cambridge, of which, after a brilliant career, he was appointed fellow (1858). At this time he was famous among his friends for many parodies and an examination paper on *Pickwick.* His publications are *Verses and Translations* (1862); *Translations into English and Latin* (1866); *Theocritus Translated into English Verse* (1869); and *Fly Leaves* (1872). Calverley holds a high place among writers of light and humorous verse, and his Latin renderings are exceedingly felicitous. After years of ill health, he died February 17, 1884. Consult Sendall, *Literary Remains,* with memoir (London, 1885).

CAL'VERT, George, and Cecil. See Baltimore, Barons of.

CALVERT, George Henry (1803-89). An American journalist and author, born in Baltimore, Md. He graduated at Harvard in 1823, studied in Göttingen, and, on his return from Germany, was editor of the *Baltimore American* for a number of years. In 1843 he removed to Newport, R. I., of which city he was elected mayor in 1853. He published a number of works in both prose and verse, including dramas, translations, and critical essays. Among them were: *Illustrations of Phrenology* (1832), the first treatise on the subject issued in this country; *Scenes and Thoughts in Europe* (1846-52); *An Introduction to the Social Sciences* (1856); *The Gentleman* (1863); *Goethe: His Life and Work* (1872); and *Three Score, and Other Poems* (1883).

CALVERT, Sir Harry (c.1763-1826). An English general. He was born at Hampton Court, and was educated at Harrow. In 1778 he was appointed second lieutenant of the Royal Welsh Fusiliers, and was soon ordered to America, where he participated in the siege of Charleston and in the campaign of Cornwallis which ended with the surrender at Yorktown. As adjutant of the Duke of York, he participated in the war with France which began in 1793. He became lieutenant-general in 1810, baronet in 1818, and general in 1821. His letters and memoranda were published by his son under the title, *Journals and Correspondence of Sir Harry Calvert, Bart.* (London, 1853).

CALVERT, Leonard (c.1606-47). The first Colonial Governor of Maryland. He was the brother of Cecil Calvert, the second Lord Baltimore, and by him was placed in charge, as Governor, of the small company of 200 men, who, in 1634, settled in Maryland under the charter secured from Charles I. by George Calvert, first Lord Baltimore. He continued to act as Governor until his death, though in 1643-44 he visited England to consult with his brother about affairs in the Colony. Perhaps the most noteworthy event during his term as Governor was his contest with William Claiborne (q.v.), who had settled on Kent Island before 1634, and denied the jurisdiction of the Maryland authorities. Claiborne was driven out in 1635, but in 1644 succeeded in expelling Calvert, who, however, again defeated him in 1646.

CALVES' HEAD CLUB. An association whose purpose was to ridicule the memory of Charles I. Its history is very obscure. According to the *Secret History of the Calves' Head Club* (2d ed., 1703), probably written by the notorious Ned Ward, it was originated by John Milton, and its meetings were given over to unseemly orgies in contempt of the Stuarts; but this book is absolutely worthless. Apparently there was no fixed place of assembly. The principal gathering is said to have taken place each year on January 30, the anniversary of the King's execution. It is highly improbable that the organization long survived the Restoration. If so, its proceedings must have been entirely secret. In 1735 a meeting of some young men calling themselves the Calves' Head Club was held at a tavern in Suffolk Street, London. An accident gave rise to a riot. As usually explained, the disturbance was caused by scandalous toasts offered within hearing of the crowd; but this is denied by Lord Middlesex, who was present. The affair has recently been pronounced a hoax, having no connection with the original association, which had doubtless long since ceased to exist. Consult: Timbs, *Clubs and Club Life in London,* new ed. (London, 1898). Compare Wilson, *Memoirs of the Life and Times of Daniel De Foe* (London, 1830); Spence, *Anecdotes,* 2d ed. (London, 1858); Walford, *Old and New London* (London, n. d.): and *Harleian Miscellany,* Vol. XII. (London, 1811).

CALVI, käl'vê. A fortified seaport of Corsica (belonging to France), situated on a peninsula in the Gulf of Calvi, about 38 miles west-southwest of Bastia. It has an old cathedral and good harbor, and carries on some trade in fish and southern fruit (Map: France, P 8). Calvi was captured by the English in 1794, after a siege of fifty-one days. Population, in 1896, 2132.

CAL'VILLE, *Fr. pron.* kål'vêl' (Fr., from Lat. *calvus,* bald, smooth surface). A kind of apple, of which there are numerous sub-varieties. The Calvilles diminish in thickness from the middle toward the calyx, where they form a point; they have regular ribs and a large open seed-chamber; also a pleasant smell, and are oily to the touch. They are never altogether streaked; they have a fine loose flesh, with a flavor somewhat resembling that of the raspberry or strawberry. The white winter Calville is in high repute, both as a culinary and dessert apple; it is very extensively cultivated on the Continent of Europe. This class of apples was early introduced in America, but is not now listed in the catalogues.

CAL'VIN (in its French form *Cauvin,* or *Caulvin*), John (1509-64). One of the most eminent of the Reformers of the Sixteenth Century. He was born at Noyon, in Picardy, France, July 10, 1509. His father, Gérard Cauvin, was procureur-fiscal of the district of Noyon, and secretary of the diocese. His mother was Jeanne Lefranc. He was one of six children—four sons and two daughters. All the three sons who survived were bred ecclesiastics; and the Reformer himself, on May 29, 1521, while still only 12 years of age, was appointed to receive part of the revenue of a chapel in the cathedral church of Noyon. This he held as a means of support during the period of his education, and even for some short time after he had entered upon his reforming career. Calvin was educated in circumstances of ease, and even of affluence. The noble family of Montmor, in the neighborhood, invited him to share in the studies of their children: he was in some measure adopted by them, and when the family went to Paris, in his fourteenth year (1523), he accompanied them, and participated in the benefits of the higher instruction which was there attainable. He was entered as a pupil in the Collège de la Marche, under the regency of Mathurin Cordier, better remembered, perhaps, by his Latin name of Corderius. It was under this distinguished master that Calvin laid the foundation of his own wonderful mastery of the Latin language. Not long afterward he left him for the strictly ecclesiastical college of Montaigu, in the same university. During this early period he was distinguished by the great activity of his mental powers and the grave severity of his manners. His companions, it is said, surnamed him the 'Accusative.'

Probably at first his father intended that he should study theology, and in 1527 got him the curacy of Saint Martin de Martheville (near Vermans, Aisne) in addition to that of the chapel, which, however, Calvin resigned in 1529, in favor of his younger brother, and the same year exchanged the curacy for another, that of Pont l'Evêque, where his father had been born. But in 1528 his father changed his mind and determined that he should become a lawyer. He therefore sent him, with the view to his studying law, to the University of Orleans, then adorned by Pierre de l'Etoile, one of the most famous jurists of his day, and afterwards president of the Parliament of Paris. At Orleans he continued the same life of rigorous temperance and earnest studiousness for which he was already noted. Beza says that, after supping moderately, he would spend half the night in study, and devote the morning to meditation on what he had acquired. His undue habits of study seem to have laid thus early the foundation of the ill health which marked his later years. It was while a law-student in Orleans that he became acquainted with the Scriptures and received his first impulse to the theological studies which have made his name so distinguished. A relative of his, Pierre Robert Olivetan, was there engaged in a translation of the Scriptures; and this had the effect of attracting Calvin's attention, and awakening within him the religious instinct which was soon to prove the master-principle of his life. We cannot say as yet that his traditionary opinions were unsettled or that he had embraced with any decision the Protestant opinions that were spreading everywhere; but the seeds of the new faith were now beyond doubt sown in his heart, and from this time, although he still continued for a while longer to pursue his legal studies, his main interests appear to have been religious and theological. From Orleans he went to Bourges (1530), where he acquired a knowledge of Greek, under the tuition of a learned German, Melchior Wolmar, whose spiritual instructions influenced him. He began here to preach the reformed doctrines, and passed into the ranks of Protestantism, under the slow but sure growth of his new convictions, rather than under the agitation of any violent feeling. Here, as everywhere, his life presents a marked contrast to that of Luther.

The death of his father in 1531 left him free to follow his inclinations, which were for theological and classical studies. He proceeded to Paris, which at this date had become a centre of the 'new learning,' under the teaching of Lefevre and Farel, and the influence of the Queen of Navarre, sister of Francis I., and there he published, at his own expense, in 1532, his first book, a commentary on Seneca's essay *On Mercy*. But reformed notions in theology were in the air. The Sorbonne itself had not escaped the infection. There was a growing religious excitement in the university, in the Court, and even among the bishops. This, however, was not to last. The King was soon stirred up to take active measures to quell this rising spirit. Calvin was himself converted to the new views, and when his friend, Nicholas Cop, had been elected to the rectorship of the University of Paris, he wrote the inaugural oration (1533) for him and took for his theme the necessity of there being a reformation of the Church and of theology on the basis of the New Testament. The result was that Calvin and Cop were obliged to flee for their lives. The story is that Calvin narrowly escaped, having descended from his window by means of his sheets, and fled, under the guise of a vine-dresser, a friend of his, in whose clothes he concealed himself. After this he repaired for a short time to his native place, resigned the preferment he held in the Roman Catholic Church, and for nearly three years led a wandering life, sheltered in various places. We find him at Saintonge; at Nérac, the residence of the Queen of Navarre; at Angoulême, with his friend, Louis Tillet; then for a brief period, while in Paris again, strangely enough expecting a meeting with Servetus, who had expressed a desire to see and confer with him. Persecution against the Protestants at this time raged so hotly that Calvin was no longer safe in France; and he betook himself to Basel, where he prepared the first edition of the *Institutes of the Christian Religion* (1536), with the famous preface addressed to Francis I. The concentrated vigor of this address, its intensity of feeling, rising to indignant remonstrance, and at times to a pathetic and powerful eloquence, make it one of the most memorable documents in connection with the Reformation. It is throughout a noble defense of the righteous character of the reformed doctrines, and their support alike in Scripture and in history. The energetic decisiveness and moral zeal of the future teacher and legislator of Geneva speak in every page of it. After completing this great service to the cause of Protestantism, he went for a short time to Italy, to visit Renée, the Duchess of Ferrara. Finally, he revisited his native town, sold the paternal estate, which had devolved to him on the death of his eldest brother, and, bidding it adieu, set out, in company with his younger brother and sister, on his way to Strassburg. The direct road being rendered dangerous by the armies of Charles V., which had penetrated into France, he sought a circuitous route through Savoy and Geneva.

The result of this journey was memorable for the cause of the Reformation. Arrived in Geneva

(July, 1536), he met there his friend, Louis du Tillet, who communicated the fact of his arrival to Farel, then in the very midst of his struggle to promote the Reformation in the city and neighborhood. Farel hastened to see him and urged upon him the duty of remaining where he was, and undertaking his share of the work of God, under the burden of which he himself was likely to sink. Calvin did not at first respond to the call. He was given, he himself says, to his "own thoughts and private studies." He wished to devote himself to the service of the reformed churches generally rather than to the care of any particular church. A life of intellectual and theological labor was that which at that time was most congenial to him. By some strange insight, however, Farel discerned the higher fitness of the young stranger who stood before him, and he ventured, in the spirit of that daring enthusiasm which characterized him, to lay the curse of God upon him and his studies if he refused his aid to the Church of Geneva in her time of need. This seemed to Calvin a divine menace. "It was," he said, "as if God had seized me by His awful hand from heaven." He yielded and joined eagerly with Farel in the work of reformation.

Such was the beginning of Calvin's great career in Geneva. Having abandoned his intention of pursuing his journey, he soon infused an energy into his task which crowned the struggling efforts of Farel with success. The hierarchical authority was already overturned before his arrival; the citizens had asserted their independence as against the Duke of Savoy, whose alliance with the ruling episcopate, which was the direct governing influence in the place, had called forth the patriotic as well as the religious feelings of the people. The magistrates and people eagerly joined with the reformers in the first heat of their freedom and zeal. A Protestant confession of faith was drawn up, approved of by the Council of Two Hundred, the largest governing board of the city, and then proclaimed in the cathedral church of St. Peter's as binding upon the whole body of the citizens. Great and marvelous changes were wrought in a short time upon the manners of the people; where license and frivolity had reigned, a strict moral severity began to characterize the whole aspect of society. The change, however, was too sudden and the strain was too extreme. A spirit of rebellion against the rule of Calvin and Farel broke forth. They, however, refused to yield to the wishes of a party animated by a more easy and liberal spirit than themselves (known in the history of Geneva under the nickname of Libertines); and the consequence was that they were both expelled from the city after less than two years' residence (April 23, 1538).

Calvin turned to Strassburg, where he had meant to go when arrested in his course in Geneva. Here he settled, and devoted himself to theological study, and especially to his critical labors on the New Testament. Here, also, in October, 1539, he married a member of his congregation, Idelette de Bure, widow of Jean Stordem, of Liège, an Anabaptist, whom he had converted, and who had died in February, 1538. The marriage appears to have proved a happy one. His wife bore him one child, a son, who, being born prematurely, died shortly after his birth. (See his letters to Viret of July and August 19, 1542.) She herself died in April, 1549.

The Genevans found, after a short time, that they could not well do without Calvin. His rule might be rigid; but an authority even such as his, which might prove galling in its severity, was better than no settled authority at all; and the Libertine party seemed to have been unable to construct any efficient and beneficent form of government. Accordingly, the citizens invited Calvin to return; and after some delay on his part, in order to test the spirit in which they were acting, he acceded to their invitation, and on September 13, 1541, after three years' absence, once more made his entry into Geneva.

Now, at last, he succeeded in establishing his plan of Church government, in all its forms and details. By his college of pastors and doctors, and his consistorial court of discipline, he founded a theocracy, with himself at the head of it, which aimed virtually to direct all the affairs of the city, and to control and modify both the social and individual actions of the citizens. Not without a struggle, it may be supposed, did he succeed in his great autocratic scheme. The Libertines, although dishonored by their ineffectual attempts to maintain order in the city, and uphold its rights and dignity, still remained a strong party, which was even augmented after Calvin's return by such men as Amy Perrin, who had strongly concurred in the invitation to Calvin, but who were afterwards alienated from him by the arbitrary way in which he pursued his designs, no less than by their own schemes of ambition. The struggle with these opponents lasted with varying fortunes for no less a period than fifteen years, and was only terminated in 1555, after a somewhat ridiculous *émeute* in the streets. Amy Perrin and others, driven from the city, were executed in effigy; and the reformer's authority from this date strengthened into an absolute supremacy.

During the period of this long struggle with the Libertines, Calvin had many other disputes, in which he displayed equal zeal. The most remarkable of these were his controversies with Sebastian Castellio, Jerome Bolsec, and, above all, Michael Servetus.

Calvin had become acquainted with Castellio in Strassburg (1540). They entertained at first a warm friendship for each other, and Calvin showed great zeal in assisting Castellio, whose poverty and learning had attracted his sympathy. When he returned to Geneva, he invited Castellio to join him there, and procured for him the rectorship in the Latin school of the city. There was little similarity, however, in the characters of the two men, and the diversity of their tastes and views soon became apparent. The learning of Castellio was intensely humanistic: a classical spirit and a somewhat arbitrary opinionativeness molded all his studies. As soon as he began to apply himself to theology, he came into conflict with Calvin. In a letter to Viret, September 11, we find Calvin speaking of "the freaks of our friend Sebastian, which may both raise your bile and your laughter at the same time." These freaks relate to Castellio's notions of scriptural translation, and his refusal of Calvin's offer to revise the version which he had made of certain parts of Scripture. Then, two years later, when Castellio desired to enter the ministry, Calvin dissuaded the council from accepting him, on account of some peculiar opinions which he held. These were certain rationalistic views as to the authenticity and character of the Song of Solomon, the descent of Christ into hell, and also about election. After this, Castellio left Geneva for a while, but soon returning, he attacked the views of Calvin openly (see Calvin's letter to Farel, May 30, 1544), and was forced to leave the city. The two old friends, now declared enemies, did not spare each other henceforth. Castellio died in Basel December 29, 1563. (For his biography, consult F. Buisson, Paris, 1892.) The fate of Servetus drew forth an anonymous publication, attacking with keen logic and covert and ingenious sarcasm the Genevan doctrines. This publication was attributed by both Calvin and Beza to Castellio, and they replied to him in no measured terms, stigmatizing him as a "deceiver and vessel of Satan." One fact really disgraceful to Calvin in the controversy ought not to be passed over. Sunk in great poverty, Castellio was obliged, in his old age, to gather sticks on the banks of the Rhine at Basel, as a means of support. Calvin did not hesitate to accuse him of stealing the sticks. Such polemical truculence may well make us turn away in disgust and indignation.

The controversy with Bolsec belongs to a later period. Jerome Bolsec was originally a Carmelite monk, but had thrown aside the habit, and betaken himself to the practice of medicine in Geneva. He was led to attack Calvin's doctrine of predestination. As soon as Calvin heard of this, he gave him to understand that he was not at liberty to question the Genevan doctrine. He and others of the clergy dealt with him; but after repeated disputations, Bolsec was found incorrigible, and was sentenced to banishment from the city (December 25, 1551). Cast out of the theocratic community, he ultimately rejoined the Roman Catholic Church, and meanly revenged himself upon Calvin by writing his life in a spirit of detraction and slander (Lyons, 1577).

Of all these contests, however, the most memorable is that with Servetus. A melancholy interest surrounds the name of this great heretic, which the criminal tragedy of his death keeps ever fresh and vivid in the minds of all who hate intolerance, and who love truth more than dogmatism. The character of Servetus himself has little to do with this interest. He seems to have been a vain, restless, and enthusiastic dreamer, rather than a calm and patient inquirer. In his very dreams, however, and the vague audacities of his speculation, there is a kind of simplicity and unconscious earnestness that wins sympathy. He had entered into various relations with Calvin even from the time of his early residence in Paris; particularly, he had sent him various documents containing the views fully developed, in his work subsequently published under the title of *Restitutio Christianismi* (1553). Calvin never concealed his abhorrence of these views; and in a letter to Farel on February 13, 1546, he says: "Servetus lately wrote to me. . . . He takes it upon him to come hither, if it be agreeable to me, but I am unwilling to pledge my word for his safety, for if he shall come, I shall never permit him to depart alive, provided my authority be of any avail." The history of his seizure and condemnation at Vienne by the Catholic authorities, and especially of Calvin's share in the correspondence which led to his seizure, is very complicated and obscure. It has been maintained that Calvin was the instigator, through a creature of his own, of the name of Trie, of the whole transaction: it is certain that he forwarded to the authorities, through Trie, private documents which Servetus had intrusted to him, with a view to the heretic's identification, and as materials for his condemnation. Servetus was sentenced to be burned, but effected his escape, and, after several months' wandering, he was found in Geneva. It was his intention to proceed to Italy, where he hoped his opinions might meet with some degree of toleration, and he arrived at Geneva on his way. This is the explanation of an event otherwise unaccountable. Having ventured to attend church, according to the common account, he was recognized, apprehended, and conveyed to prison by Calvin's order, just as he was about to leave the city. The particulars of his trial are full of interest, but too detailed to be given here. It lasted, with various interruptions, for two months. He attacked Calvin with the most foul epithets, and Calvin retorted with a virulence and foulness quite equal to his own. At length, on October 26, 1553, sentence was passed upon Servetus, condemning him to death by fire. Calvin used his influence to have the mode of death altered to decapitation, but without success. On the very next morning the sentence was put into execution. On an eminence, at some distance from the city, Servetus was fastened to a stake, surrounded by heaps of oak-wood and leaves, with his condemned book and the MS. he had sent to Calvin attached to his girdle; and, amid his agonizing cries, the fire was kindled, and the wretched man expiated his heresy in the flames. Whatever apologies may be urged for this memorable crime, it must remain a mournful and scandalous blot on the history of the Reformation. The disgrace of it has particularly attached to Calvin, and with much justice, from the special and unhappy relation which he bore to the whole transaction; but many of the other reformers are no less implicated in it. The wise Bullinger defended it, and even the gentle Melanchthon could see only cause for gratitude in the hideous tragedy. See **Servetus**.

After the execution of Servetus, and the expulsion of the Libertines, two years later, Calvin's power in Geneva was firmly established, and he used it vigorously and beneficently for the defense of Protestantism throughout Europe. By the mediation of Beza, he made his influence felt in France in the great struggle there going on between the hierarchical party, with the Guises at its head, and the Protestants, led by Condé and Coligny. In 1561 his energies began to fail. He had long been suffering from bad health, but his strength of will and buoyancy of intellect sustained him amid all his bodily weakness. In the year now mentioned, his bad health greatly increased, and although he survived for more than two years, he never regained his vigor. He died in Geneva on May 27, 1564.

Very different estimates, it may be imagined, have been formed of Calvin's character, according to the point of view from which it is contemplated. None, however, can dispute his intellectual greatness, or the powerful services which he rendered to the cause of Protestantism. Stern in spirit and unyielding in will, he is never selfish or petty in his motives. Nowhere amiable, he is everywhere strong. Arbitrary and cruel when it suits him, he is yet heroic in his aims, and beneficent in the scope of his ambition. Earnest from the first, looking upon life as a serious reality, his moral purpose is always clear and definite—to live a life of duty, to shape circumstances to such divine ends as he apprehended, and, in whatever sphere he might be placed, to work out the glory of God.

He rendered a double service to Protestantism, which, apart from anything else, would have made his name illustrious: he systematized its doctrine and he organized its ecclesiastical discipline. He was at once the great theologian of the Reformation, and the founder of a new Church polity, which did more than all other influences together to consolidate the scattered forces of the Reformation and give them an enduring strength. As a religious teacher, as a social legislator, and as a writer, especially of the French language, then in process of formation, his fame is second to none in his age, and must always conspicuously adorn the history of civilization. Among Calvin's most important works are: *Christianæ Religionis Institutio* (1536); *De Necessitate Reformandæ Ecclesiæ* (1544); *Commentaires sur la concordance ou harmonie des Evangélistes* (1561); *In Novum Testamentum Commentarii; In Libros Psalmorum Commentarii; In Librum Geneseos Commentarii.* The first edition of Calvin's whole works is that of Amsterdam, 1671, in 9 vols., fol., but this has been superseded by the definitive and critical edition begun by J. W. Baum, E. Cunitz, and E. Reuss, and finished by Lobstein and Erichson (59 vols., Brunswick and Berlin, 1863-1900). Consult A. Erichson, *Bibliographica Calviniana* (Berlin, 1900). By the Calvin Translation Society, in Edinburgh, his works have been collected, translated into English, and issued in 51 vols., 1843-55. For his biography, consult: T. de Beza (Geneva, 1564; n. e. Paris, 1869), the original life, written a few weeks after Calvin's death; J. Bolsec (Lyons, 1577; n. e. 1875); and J. M. V. Audin (Paris, 1841: 6th ed. 1873), written from the Roman Catholic standpoint: P. Henry (3 vols., Hamburg, 1835-44), English translation abridged and altered by Stebbing (London, 1851); T. H. Dyer (London, 1850); F. Bungener (Paris, 1863, English translation Edinburgh, 1863); E. Staehelin (Elberfeld, 1863); A. Pierson (Amsterdam, 1883-91)—all of which are written from the Protestant point of view. A very valuable and impartial book from a Roman Catholic is, F. W. Kampschulte, *Johann Calvin, seine Kirche und sein Staat in Genf* (Leipzig, 1869-99). An exhaustive work is that of E. Doumergue, of which the first volume appeared in Lausanne in 1899. It contains many illustrations from original drawings, facsimiles, etc., and is the work of a lifetime. Consult also the biography of Calvin by Philip Schaff in his *History of the Christian Church* (New York, 1892), Vol. VII., pp. 257-844.

CALVINISM. The system of thought deriving its name from its greatest representative, John Calvin (1509-64). It has its starting-point in the conception of the sovereignty of God. This is not merely His sole causality in the physical universe, but His priority, in particular, in the whole realm of the religious life. The fundamental element of the system was expressed by Schleiermacher, *Die christliche Glaube* (Sec. 32 ff.), and after him by the learned historian of the reformed theology, Schweizer, *Die Glaubenslehre der evangelisch-reformirten Kirche* (Sec. 23), as the feeling of the entire dependence of all that is and takes place upon God. This predestination, which has sometimes been seized upon as the distinguishing feature of the system, is a consequence of the true principle rather than that principle itself.

The historical origin of Calvinism goes far back of Calvin himself. It found its first prominent exponent in Augustine (q.v.), though its essential elements may be detected in the earliest history of the Church. It took its Augustinian form in consequence of the discussions of the Pelagian controversy (see PELAGIANISM), in which the point at issue was the originating source of conversion. Pelagius mantained that this was in the independent action of man, Augustine that it was in the prevenient grace of God, eliciting the human activity. From this germ developed the most distinctive features of Augustinianism, original sin, bondage of the will, and inability to be good, predestination, and the reference of all good to God alone. The tendency of the course of discussion in the Middle Ages was to weaken the Augustinian system, but it was restored by the Reformers, Luther, Zwingli, and Calvin. The latter incorporated it in his *Institutes* (final edition, 1559), which was the most perfect system of Christian doctrine that had ever been produced. From this work it went into the great Protestant confessions, the Heidelberg, French, Belgic, Synod of Dort (on occasion of the controversy with the Arminians, q.v.), and the remarkable series of English confessions, beginning with the *Articles of the Church of England* (first issued in 1552), embracing the Lambeth (1595) and the Irish (1615) articles, and concluding with the Westminster (1647). It was represented by a long series of divines, of whom Beza, Bullinger, Ames, Turretin, John Owen, Jonathan Edwards, and Charles Hodge (best recent statement of the system) may be mentioned. It is now the confessional theology of the Presbyterian and so-called 'Reformed churches in all the Protestant nations. In New England, under the influence of Edwards and his pupils, there arose a school of 'consistent' Calvinists, who variously modified the details of the system, principally in consequence of a new psychology of the will and of virtue. But this has manifested its essential divergence from Calvinism by the further development through which it has gone.

The decisive element of the Calvinistic system is, then, its doctrine of God. With other Protestant systems, it is distinctly theistic and trinitarian. It lays emphasis upon the immutable nature of God, and upon His unchangeable attributes of justice and love, each equally sovereign. God's design in the creation of the world was the manifestation of His own glorious attributes, of which these are the chief. Accordingly, He forms in eternity the plan upon which he conducts both creation and the government of the created world. He "foreordains whatsoever cometh to pass." Two schools have arisen as to the order of the divine decrees: one, the 'Supralapsarian,' looking to the final result as the first thing contemplated in God's decree, and making their order, therefore, creation, election, and reprobation, the fall, redemption by Christ, and application of redemption by the Holy Spirit; the other, the 'Infralapsarian,' which seeks to avoid the impression gained from Supralapsarianism, that men are condemned before they are guilty, by making the order of decrees, creation, fall, election, redemption, etc. The latter has been the prevailing view among Calvinists, though many regard the difference as merely logical.

The decree of the fall is the decree that man shall sin; but Calvinists generally regard this as a permissive decree, and all understand that man sins in perfect freedom, and that sin is his own act, and not that of God. All the decrees equally preserve the freedom of man. This theological proposition is explained by various theories of the will and of the psychology of moral action. None of these can be regarded as essential to the system, which is independent of its psychological explanation. The first sin, the sin of Adam, did not affect him alone, but involved the race in sin and guilt. Every member of the race is so connected with its first member (whether by divine constitution, by a realistic identity, or by federal representation) that all sin in and with him and are justly condemned for that sin. Thus Adam's sin is said to be 'imputed' to his descendants. Imputation is either 'mediate,' that is because of original depravity, or 'immediate,' by which original depravity is the penal result of original guilt directly imputed. Original sin, which is prenatal forfeiture of the indwelling of the Holy Spirit, with consequent defect and disorder of soul, and inclination to evil, results in actual and individual sin. The consequence of all this is a total inability to be good and the absolute necessity of regenerating grace before any soul can repent and receive the divine forgiveness. Hence the electing grace of God cannot be conditioned upon the foreseen faith of the elect, because, apart from God's activity, and thus apart from His purpose to act in their behalf, or apart from election, they have no faith and can have none.

Grace is the favor of God shown to the undeserving. It is the execution of the decrees of God. God, in forming the decree of election, is sovereign; that is, the motive which leads Him to set apart a certain and fixed number of souls unto eternal salvation resides in Himself alone, and not in them. Grace is of three kinds: 'Common' grace is bestowed upon all men, tends to good, and results in the various natural virtues, such as kindliness, honesty. 'Prevenient,' 'effectual,' or 'irresistible' grace is that by which the soul is regenerated. It is sometimes said to be an activity beneath consciousness, or effected creatively, in the very nature of the soul. By it the will is moved to holy action, and repentance and faith are produced. 'Coöperative' grace works with the will thus turned to God, and is the case of what degree of actual holiness the Christian attains. Grace also includes the 'gift of perseverance,' which secures the perseverance and final salvation of the soul.

The Calvinistic doctrine of the Atonement depends upon the positions already rehearsed. It is an act of the infinite love of God finding a way whereby both His attributes of justice and mercy may be completely and consistently exercised in the salvation of men. It provides a substitute for the sinner who, because of his humanity, can represent man, and because of His divinity, can offer a sufficient sacrifice for men's sins. The God-man bears the penalty of the sins of men as a true penal substitute, thus satisfying justice, and works out a perfect righteousness for weak and imperfect men; and thus He provides for both the forgiveness and the justification of the believer.

The adherents of Calvinism claim for it a great and decisive influence for good upon the history of the world. As the religion of the French Huguenots, of the founders of the Dutch Republic, of Scotch Covenanters, and of English Puritans, it has its heroic period to point to, and its roll of martyrs second to none. Bancroft, the historian of the United States, himself not a Calvinist, refers modern republican liberty to the influence of the little Republic of Geneva, and to Calvinism. Its influence in promoting the independence of the United States was indisputably great. It has proved one of the chief forces in promoting the education of the common people, and in fostering higher education in the modern world. And its efforts in the department of foreign missions during the last century led and surpassed those of other schools of thought.

For the essential sources in the study of Calvinism, consult: Bright, *Select Anti-Pelagian Treatises of Saint Augustine* (London, 1880, for the Latin text, or Warfield's "Augustine's Anti-Pelagian Treatises," in *Nicene and Post-Nicene Fathers*, Vol. V. (New York, 1886-88); Calvin, *Institutio Christianæ Religionis*, edited by Tholuck (Berlin, 1846); English translation, *The Institutes of the Christian Religion* (Philadelphia). Best modern presentations: Charles Hodge; *Systematic Theology* (3 vols., New York, 1872): W. G. T. Shedd, *Dogmatic Theology* (3 vols., New York, 1888). Expositions. A. A. Hodge, *A Commentary on the Westminster Confession of Faith* (Philadelphia, 1869); A. Kuyper, "Calvinism," *The Stone Lectures* (New York, 1898). See ARMINIANISM.

CALVINISTIC (or PARTICULAR) **BAPTISTS.** See BAPTISTS.

CALVINISTIC METHODISTS. A body in Great Britain in three divisions: the Whitefield Connection, 1741; Lady Huntingdon Connection, 1748; and Welsh Methodists, 1750. See PRESBYTERIANISM.

CALVO, käl'vô, CARLOS (1824-93). An Argentinian diplomat and writer on international law. He was born in Buenos Ayres and early entered upon a diplomatic career abroad. He was one of the founders of the Institut de Droit International, and later the Ambassador of the Argentine Republic to France. Among his principal works are the following: *Recueil complet des traités, conventions, etc., de l'Amérique latine* (11 vols., 1862-69); *Annales historiques de la révolution de l'Amérique latine*

(5 vols., 1864-75): *Le droit international théorique et pratique* (4th ed., 1887-88); *Manuel de droit international public et privé* (3d ed., 1892).

CAL'VUS, Gaius Licinius Macer (B.C. 82-47). A Roman poet and orator. In the latter capacity he is often praised by Cicero (*Brut.*, lxxxi., lxxxii., ss. 280-285; *Ep. ad Fam.* vii. 24; xv. 22). According to the ancients (Quint. x., s. 111; Catullus, 96; Propertius, ii. 19, 40; Ovid. *Am.*, iii. 9. 61); his poems were full of wit and grace, and were classed with those of Catullus. The latter addressed three of his odes (14, 50, 96) to Calvus.

CAL'YCAN'THUS (from Gk. *κάλυξ*, *kalyx*, cup + *ἄνϑος*, *anthos*, flower, referring to the cups enclosing the pistils). A genus of Calycanthaceæ, an order of plants allied to Rosaceæ. Only about six species are known. They are shrubs with opposite entire leaves, and are natives of North America and Japan. An aromatic fragrance characterizes the order, and in the genus Calycanthus the bark and leaves possess it as well as the flowers. The bark of the Calycanthus has acquired the name of Carolina allspice, or American allspice. The flowers are of a chocolate or dull purple color. It is quite a favorite garden shrub, being commonly known as 'sweet-scented shrub.' The four American species are found wild along the Alleghanies, in Pennsylvania, Virginia, etc., except *Calycanthus occidentalis*, with brown flowers, which grows in California only.

CAL'YDON (Gk. Καλυδών, *Kalydōn*). An ancient city of Ætolia, 7½ miles from the Ionian Sea on the river Evenus. It was celebrated in Greek legend as the home of Meleager, Tydeus, and other heroes, but in historic times was of small importance. In B.C. 391 it was in possession of the Achæans, and was of strategic value in the war between Cæsar and Pompey. In B.C. 31 Augustus removed the inhabitants to Nicopolis, a city then founded to commemorate the victory of Actium. The site is generally believed to be at the Kastro of Kurtaga, on the river Phidharis, where are remains of walls and gates, as well as terraces and foundations. Consult Woodhouse, *Ætolia* (Oxford, 1897).

CALYDON. A great forest, supposed to have once existed in the north of England and mentioned in Arthurian romance. It may have corresponded with the thickly wooded district of the 'Midlands,' which reached up into Yorkshire, and which contained the 'Sherwood' associated with the Robin Hood legends.

CAL'YDO'NIAN BOAR. According to a Greek myth, a certain Œneus, King of Calydon, in Ætolia, omitted a sacrifice to Artemis, whereupon the goddess, in her rage, sent into his fields a frightful boar, which committed great devastation. No one had the courage to hunt it except Meleager, the son of Œneus, who, calling to his help the bravest heroes of Greece—Theseus, Jason, Nestor, and others—pursued and slew the monster. This hunt is a favorite subject in Greek art, and appears not only on the vases and reliefs, but was also represented in the pediment of the Temple of Athena Alea at Tegea by the great sculptor Scopas, of whose work some fragments have been found, and are now in Athens. See Meleager.

CALYMMENE, kȧ-lĭm'ê-nē (Gk. *κεκαλυμμένη*, *kekalymmenē*, fem. perf. part. of *καλύπτειν*, *kalyptein*, to cover; refers to the thorax and shield). A genus of fossil trilobites characteristic of the Silurian system. It has a rather long body, of oval form, with a semicircular head-shield and a thorax of 13 segments. The tail-shield is lobed like the thorax, and is not clearly distinguishable from the latter. About 60 species of Calymmene have been described from the Silurian and Ordovician strata, and the largest have been found in the lower Devonian rocks. Calymmene blumenbachia and Calymmene senaria are prominent species.

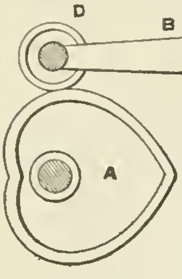
CALYP'SO (Gk. Καλυψώ, *Kalypsō*). In Grecian legend, a nymph, dwelling alone on a remote island, who rescued the shipwrecked Odysseus, and kept him with her seven years, promising him immortality, but unable to make him cease his longing to return to Ithaca. She finally yielded to a command of Zeus and allowed him to depart on a raft of his own building. Calypso is a somewhat late addition to the Odysseus story, and is merely a name outside of the Homeric poem. Her sons by Odysseus are entirely without connection with the general story.

CALYP'TRA (Gk. *καλύπτρα*, *kalyptra*, from *καλύπτειν*, *kalyptein*, to conceal). A term commonly applied to the enlarged and ruptured archegonium (female organ) of the true mosses, which is carried up as a loose hood, capping the spore-case. Its application is often extended, however, to include any development of the archegonium which follows fertilization. See Musci.

CA'LYX (Lat., Gk. *κάλυξ*, *kalyx*, cup of a flower, from *καλύπτειν*, *kalyptein*, to cover). In flowers, the outer and sometimes the only set of floral leaves. The individual parts are called 'sepals,' and when these are not present the flower is said to be 'naked.' The sepals are usually green and leaf-like, and serve to protect the more delicate inner parts of the bud, but sometimes they are very much modified. See Flower.

CAM (Kelt., crooked), or Granta. A river which rises in Essex, England, and is known as the Granta until it joins with the Rhee, 3 miles above Cambridge, to which city it gives its name. After a northeasterly course of about 40 miles through Cambridgeshire, it joins the Ouse, 3½ miles above Ely. It is a favorite boating river, famous in connection with the boat-races of the students of Cambridge University.

CAM (dialectic form of Engl. *comb*; cf. Ger. *Kamm*, comb, *Kammrad*, cog-wheel). A revolving disk eccentrically mounted on a shaft and employed in mechanism to impart by its rotation a reciprocating motion to a rod or shaft. One of the common forms of cam is a heart-shaped wheel mounted on a shaft as shown at *A*. The operation of this form of cam may be indicated by the lever *B*, pivoted at the centre and carrying at one end a rod, *C*, and at the other end a wheel, *D*, which has a rolling bearing against the face or edge of the cam. As the cam rotates, the wheel, *D*, will be raised and lowered, and this movement will, through the medium of the lever, *B*, raise and lower the rod, *C*, so as, for example, to open and close a valve. Cams are made in a great variety of shapes. By cutting teeth on the edge of the cam, *A*, and also on the edge of the wheel, *D*, and arranging the two so that their teeth mesh, we have what is called a 'cam gear-wheel' arrangement. A circular wheel, mounted concentrically on a shaft and having a lug or projection at intervals on its edge, is called a 'cam-wheel.' Cams and cam-wheels are extensively employed in mechanisms for all sorts of purposes.



CAM.

CAM, käN, Auguste Nicolas (1822—). A French sculptor, born in Paris. He was educated in the atelier of Rude, and until about 1865 confined himself almost entirely to the representation of small animals. Afterwards, however, he departed from this genre and preferably represented combats between beasts of prey. His best-known works are: "Linnets Defending Their Nest Against the Rat" (1846); "Frogs Demand a King" (1851); "Tiger in Conflict with a Crocodile" (1870); "Rhinoceros Attacked by Tigers" (1884, Garden of the Tuileries); "Eagle and Vulture Wrangling Over the Carcass of a Bear" (1890).

CAM, käN′, or **CÃO**, kouN, Diogo. A Portuguese navigator of the Fifteenth Century, who continued the African discoveries inaugurated by Prince Henry. In a voyage made in 1484-85 he sailed along the west coast of Africa as far as the Congo. He had sufficient influence with the King of Congo to induce that monarch to permit the establishment of Christianity in his dominion.

CAMACHO, kȧ-mä′chō̇. The unhappy bridegroom of Quiteria in Cervantes's *Don Quixote*. He is cozened out of his wife, after he has prepared a great feast in her honor.

CAMAJUANI, kä′mȧ-hwä′nė. A city of Cuba, in the Province of Santa Clara, about 20 miles from the northern coast of the island. It is connected by rail with Havana, Cardenas, and the coast. Population, in 1899, 5082 (municipal district, 14,495).

CAMAL′DOLITES. A religious order, founded in the vale of Camaldoli (Neo-Lat. *Campus Maldoli*), near Arezzo, in the Apennines, in 1012, by Saint Romuald (c.950-1027), a Benedictine monk, and a member of the family of the dukes of Ravenna. It soon spread through Italy. The brethren, who wear white garments, are, and have always been, characterized by the excessive rigidity of their monastic rule, yet on festival days they are allowed to eat fish and drink wine. The order has greatly declined, until now it has only six monasteries and about 200 members. Its greatest ornaments have been Gratian, the great canonical jurist of the Twelfth Century, and Pope Gregory XVI. (1831-46). There was an order of nuns of the name, but it has now only convents in Rome and Florence. The former convent of Camaldoli, near Naples, is famous for the unsurpassed view of the Bay of Naples which its garden affords.

CAMALIG, kä′mȧ-lēg′. An inland town of the Philippines, in the Province of Albay, Luzon. It lies 7 miles west of Albay, the capital, in a plain near the source of the Juaya River. Population, in 1898, 14,868.

CAMARA Y LIBERMOORE, kȧ-mä′rȧ ē lē′bâr-mō̇-ō′rȧ, Manuel de la (1836—). A Spanish naval officer. He was born in Malaga, graduated at the naval academy in San Fernando, and served in the Mexican campaign as staff officer of Admiral François Jurien de la Gravière, and later acted successively as lieutenant on the *Vencedora* and sailing master on the *Villa de Madrid*. He subsequently figured prominently in the campaign against Peru and Chile, and in the struggle with Cuba (1868-78), and, with the rank of captain, commanded a squadron in the Philippines. He was then appointed chief of the naval commission to the United States and London, and as vice-admiral commanded the squadron dispatched to the Philippines during the progress of the Spanish-American War. This squadron, consisting of the *Pelayo*, *Cárlos V.*, *Audaz*, *Osado*, *Proserpina*, *Rápido*, *Patriota*, *Buenos Aires*, *Isla de Panay*, *Colón*, *Cavadonga*, and *San Francisco*, sailed from Cadiz, with 3000 soldiers, on June 16, 1898, and had already passed the Suez Canal en route for the Philippines, when the news of the destruction of Cervera's fleet compelled it to return.

CAM′ARAL′ZAMAN. A prince in one of the tales of the *Arabian Nights* who fell in love with the Princess Badoura as soon as he caught sight of her.

CAMARGUE, kȧ′märg′, Isle de la. See Bouches-du-Rhône.

CAMARILLA, kä′mȧ-rē′lyȧ (Sp., little room, from Lat. *camara*, vault). As *camara* is used to designate the chamber of the King of Spain, the royal chamber, so *camarilla* is used to designate his private chamber or cabinet, the place where he receives his most intimate friends, courtiers, and sycophants. In the political language of modern Europe it has come to signify the influence exercised on the State by secret and unaccredited counselors, in opposition to the opinions of the legitimate Ministry. The camarilla is an old institution in Spain, but the word first began to be widely used in the time of Ferdinand VII.

CAMARINA, kä′mȧ-rē′nȧ (Gk. Καμάρινα, *Kamarina*). A ruined city in Sicily, about five miles in circumference and about 100 miles southwest of Syracuse, not far from the sea. It is east of the Camarina (ancient Hipparis) where, on a sand-hill 100 feet high, now stands the Chapel of the Madonna di Camarina. It was founded by Syracuse B.C. 599, destroyed in 553 for rebellion, rebuilt by Hippocrates of Gela in 492 after the battle of the Helorus, again depopulated in 484 by Gelon, who transferred the inhabitants to Syracuse, and again colonized from Gela in 461. In 405 Dionysius compelled the inhabitants to accompany him on his retreat, and it was destroyed by the Carthaginians. In 339 it was recolonized by Timoleon, and in 258 fell into the hands of the Romans, who sold most of the citizens into slavery. In A.D. 853 it was destroyed by the Saracens, who left only the ruined walls and temples that now attest its ancient splendor.

CAM′ASS RAT (Am. Indian). The pocket-rat of the northwestern United States, which feeds mainly on the camass (*Camasia esculenta*). See GOPHER.

CAMAYEU, *Fr. pron.* kȧ′mȧ′yē′, or MONOCHROME (Fr. *camaïeu*, cameo, and Gr. μόνος, *monos*, one + χρῶμα, *chrōma*, color). Terms by which painting in one color is designated. The ancients painted thus both in gray (*en grisaille*) and in red. Pictures of several tints, but where the natural colors of the object are not copied, are said to be *en camayeu*. As one color generally prevails, we speak of blue, red, yellow, green camayeu. Polidoro Caravaggio, for example, so overlaid his other colors with brown that his works give the impression of monochrome paintings. Drawings in India ink, red and black chalk, pencil, etc., as well as engravings, may be said to be *en camayeu*.

CAMBACÉRÈS, käɴ′bȧ′sȧ′rĕs′, JEAN JACQUES RÉGIS, Duke of Parma (1753-1824). A French statesman. He was born in Montpellier, and became a member of the Convention, where his judicial training at once brought him into prominence. His moderation in the midst of stirring events was soon manifested, particularly in his attitude toward the condemnation of the King. After the fall of Robespierre, he succeeded for a short time to the presidency of the Convention, and he at once began working for peace at home and abroad. Forced from office, he devoted himself to his *Projet de code civil*, from which the Code Napoléon was derived. In October, 1796, he became president of the Council of Five Hundred, and in June, 1799, Minister of Justice. After the eighteenth Brumaire (November 9, 1799) he became Second Consul under Napoleon, who, on ascending the throne, made him High Chancellor of the Empire and in 1808 Duke of Parma. In 1813-14, while Napoleon was absent in the field, Cambacérès directed civil affairs as president of the Council of Regency, finally voting for Napoleon's abdication, but during the Hundred Days he reluctantly served Napoleon as Minister of Justice and president of the House of Peers. After the Second Restoration Cambacérès returned to Paris, but was exiled in 1816 as a 'regicide.' His legal and political rights were restored to him in 1818. He took no part in public life afterwards and died March 8, 1824.

CAMBAL′LO. The second son of Cambuscan, in Chaucer's *Squire's Tale*. In the prologue to the tale it is prophesied that the unfortunate falcon will "get her love again" by his 'mediation,' and that he will fight in the lists for Canace's sake. But how he accomplishes this is left unexplained. He appears in Spenser's *Faerie Queene* as Cambel.

CAMBALUC, käm′bȧ-lo͞ok′, or **CAMBALU**, käm′bȧ-lo͞o′ (Mongol *Khan-Baligh*, 'city of the Khan'). The former name of Peking (q.v.), China.

CAMBAY′ (Hindi *Khambāt*, from Skt. *khambavati*, possessing pillars). The capital of the native State of Cambay, Gujerat, India, standing at the head of a gulf of the same name, on the right bank of the Mahi, 76 miles to the north-northwest of Surat (Map: India B 4). It contains about 30,000 inhabitants, but was at one time much more populous; ruined palaces, mosques, and tombs, and an excavated temple of considerable pretensions, attest its former magnificence and extent. The gradual obstruction of seaward navigation has contributed to its decline. The export of cotton is the staple trade and it has celebrated manufactures of onyx, agate, and carnelian ornaments.

CAM′BEL. See CAMBALLO.

CAMBERT, käɴ′bâr′, ROBERT (c.1628-77). A French composer. He was organist of the Church of Saint Honoré, and musical superintendent to Anne of Austria, the mother of Louis XIV. At the suggestion of the Abbé Perrin, he composed *La pastorale* (1659), regarded as the first French musical comedy. Cambert may therefore be considered as the founder of French opera. Under the favor of Louis XIV. and Mazarin, the *Pastorale* was followed by *Ariane et Bacchus* (1661); *Pomone* (1671); and *Les peines et les plaisirs de l'amour* (1672). Together with Perrin, who furnished the text for his operas, Cambert became director of the first French opera house, the Paris "Académie Royale de Musique," but was soon superseded by his rival Lully. After Lully became musical superintendent to the King, Cambert went (1673 or 1674) to London, where he became master of the music to Charles II.

CAM′BERWELL. A parliamentary borough of London, situated south of the Thames.

CAMBERWELL BEAUTY. The English name for the widespread butterfly *Vanessa antiopa*, called the United States 'mourning-cloak' (q.v.).

CAMBIASO, käm-byä′sō, LUCA (1527-85). An Italian painter, born in Moneglia. He gained celebrity at an early age, and in 1583 was invited to Spain by Philip II. to assist in the decoration of the Escurial, in which he painted the ceiling of the choir, representing the "Assemblage of the Blessed," which is considered his best work. Among others of his works are the "Rape of the Sabine Women," the "Sleeping Cupid," and "The Martyrdom of Saint George."

CAMBIER, käɴ′byȧ′, ERNEST (1844—). A Belgian explorer, born in Ath. In 1877 he accompanied the first expedition sent out by the International African Association as astronomer and geographer, and upon the death of Crespel was appointed chief of the expedition. He penetrated from Bagamoyo into the interior of Africa, proceeding to Unyamwezi, and thence to Karema on Lake Tanganyika, where, in September, 1879, he established the first post and scientific station of the International Association. He returned to Europe in 1882. Consult A. J. Wauters, *Le capitaine Cambier et la première expédition de l'Association Internationale Africaine* (Brussels, 1881).

CAMBI′NA. The mistress and eventual wife of Cambel in the *Faerie Queene*. She has inherited her mother's (Agape's) supernatural abilities.

CAM′BIUM (Neo-Lat., from Med. Lat. *cambire*, to exchange). A zone of actively dividing cells between the wood and bark of ordinary shrubs and trees. See ANATOMY OF PLANTS.

CAMBO′DIA (Skt. *Kambōja*). Once a powerful kingdom of extreme southeastern Asia;

latterly a French possession, constituting one of the divisions of the general government of Indo-China (Map: Siam, K 8). Two of its provinces, however, have become annexed to Siam, its neighbor on the northwest. Cambodia is bounded by Annam on the east and by Cochin-China and the Gulf of Siam on the south. The parallel of 12° N. crosses it about the middle. Its area is about 37,500 square miles, divided among 57 native provinces. The country has scarcely been explored, and there is comparatively little known about it. It is generally level. The western, northwestern, and eastern portions, however, are more or less broken with wooded hills and plateaus, reaching a height of about 4000 feet in parts. The great waterway is the navigable Mekong River, which annually overflows and richly fertilizes a wide territory. An arm connects the Mekong with an extensive lake on the borders of Siam, called Tonle Sap, which, according to the alternations of low and high water, at one time discharges its surplus waters into that river and at another is replenished by the waters sent forth by the Mekong.

Despite the fact that Cambodia is in the torrid zone and on the whole a low-lying region, its climate is not as intolerably hot as might be expected, the heavy rains moderating the temperature. The main climatic features are determined by the monsoons. There are two seasons, the wet and the dry. The flora and fauna are characteristic of the Indo-Chinese region. Tigers, leopards, and elephants are found in many sections. Gold, silver-bearing lead, copper, iron, and lime exist, but only the last two are profitably available. The fisheries form a notable industry, both along the islands of the coast and on the Tonle Sap (q.v.).

Agriculture is the leading occupation. The well-populated river plains and islands produce rice, the main food of the country. Cotton, tobacco, pepper, cardamom, beans, sugarcane, maize, indigo, the mulberry, coffee, cacao, and vanilla are grown. Cattle-raising is quite general. Some eighty kinds of valuable wood are found, such as ebony, rose, sapan, and pine. The gathering of these woods, together with palm-sugar, wax, and gum, forms a noteworthy branch of industry. Silk-weaving is a large domestic occupation. There are considerable factories for shelling cotton-seeds near the capital, Pnom-Penh (q.v.), a city of about 50,000 people, situated in the heart of the country. Cambodia has no seaport of commercial importance, Kampot having merely a local or inland trade. Generally speaking, however, easy communication is had, both by land and by water, with the interior. Telegraph lines connect the principal towns with each other, and with Burma. But there are no railways, no modernized facilities for transporting articles of commerce. The export and import trade is through Saigon, the capital of Cochin-China. The exports include chiefly rice, and salted fish (about 13,000 tons annually). Cotton, tobacco, gum, and wood are exported. The imports embrace silk stuffs, salt, wine, opium, textiles, and arms. The total annual value of the commerce, including both imports and exports, as given by French authorities, is about $5,000,000.

Cambodia has been under the protection of France since 1863. The government is a monarchy. The King has five ministers. In 1884, under the new treaty signed with King Norodom, the administration was practically handed over to France, the native functionaries being appointed by the King with the approval of the local French officials, who are under the direction of the Governor-General of French Indo-China, who is represented by a resident. The budget of Cambodia for 1901 was fixed at 1,951,487 piastres. The inhabitants are estimated at 1,500,000, nearly four-fifths of whom live in the river regions.

Outside of recent Annamite and Chinese immigrants and a considerable body of Malays, the population of Cambodia consists mainly of the Cambodians proper, or Khmers, formerly widespread over much of Indo-China, to whose half civilization belong the wonderful architectural remains of Angkor (now in Siamese territory), etc.; the Penong, or 'savages,' of the eastern table-lands and mountains, belonging, with the Mois of the adjacent regions, to a primitive element of the population; the Khois, or Kuis, another aboriginal group in the northwest; and lastly, the Tsiam, or Chiam, in the south, who seem to be the survivors of the extinct empire of Champa, once dominant over all eastern Indo-China. All these peoples are now considerably mixed, the Khmers most, the mountain aborigines least, with Aryan (Hindu), Dravidian, Malay, and Tibeto-Chinese blood and with the Hindu influence (the alphabet of the Cambodians and the sacerdotal vocabulary are of Pāli origin) predominating in religion, art, and literature among the more civilized sections. The Penong are rather short, dolichocephalic, much lighter-skinned than the surrounding peoples; the Khois, darker-skinned, taller, and inclined to be short-headed; the Tsiam, dark-skinned and rather handsome in form and features, with some negroid suggestion in hair, etc. The Khmers are taller and less Mongoloid in appearance than the Annamese, Siamese, and closely related peoples. In speech the Penong and Khois probably represent a primitive variety of Indo-Chinese stock. The Khmer language differs in certain marked respects from the latter, and, like that of Tsiam, is said to have Malayan affinities, but this is not clearly made out, and the speech of the Khmers is largely *sui generis*. Buddhism is the prevailing religion. Some of the Tsiam profess Islam. Christianity and education have scarcely made a beginning. The Khmers are peaceful and teachable, but phlegmatic. Polygamy is practiced, but not more than three wives are permitted. The dwellings are mostly along the river-banks. Slavery has almost disappeared, having been abolished by the French in 1884.

That Cambodia was once an extensive and powerful State and under a much higher grade of civilization than at present is shown by the superb architectural remains, the ruins of Angkor being especially noticeable. The early history of Cambodia, like that of Siam and Annam, with whose fortunes its own were often closely connected, is extremely obscure; but legend would seem to point to India as the source of the earliest migrations into the country. From Chinese notices it is known that a kingdom of Cambodia was already in existence not very long after the beginning of the Christian Era, and that, after a short period of submission to China, in the Sixth or Seventh Century, it attained to a high degree of splendor. With the beginning of the Fourteenth Century, the period of decadence set in, the kingdom grew exhausted in continuous warfare against Siam and Annam, and was forced to pay tribute to each in turn, or to both. The first Europeans in Cambodia were the Portuguese, who founded a mission there in 1553. The attempts made by the Dutch and the English to establish themselves in the region proved unsuccessful, and when the French first turned their attention to the land, in the middle of the Nineteenth Century, European influence was non-existent there.

Consult: Verschuur, *Aux colonies d'Asie et dans l'océan Indien* (Paris, 1900); Lagrillière-Beauclerc, *A travers l'Indo-Chine, Cochinchine, Cambodge, Annam, Tonkin, Laos* (Paris, 1900); Leclère, *Cambodge, contes et légendes* (Paris, 1895); id., *Recherches sur la législation cambodienne: Droit privé* (Paris, 1890); *Droit public* (1894); *Législation criminelle* (1894); Wake, "Les Cambodgiens et leur origine," in the *Revue d'Anthropologie* (1886); Bergargne, "L'ancien royaume du Campa," in the *Revue Asiatique* (1888); Fournereau, *Les ruines khmères* (Paris, 1890).

CAMBODIA RIVER. See MEKONG.

CAMBOGE, kăm-bōj'. See GAMBOGE.

CAMBON, käɴ'bôɴ', JULES MARTIN (1845—). A French legislator and diplomat, brother of Pierre Paul Cambon. He was born in Paris, and began the practice of law in 1866. After serving in the war of 1870-71, he was appointed auditor of the provisional commission appointed in 1871 to replace the Council of State. In 1874 he was appointed director-general of the civil affairs in Algeria; in 1879, secretary-general of the prefecture of police in the Department of the Seine; and in 1891 Governor-General of Algeria. He was Ambassador of France at Washington from 1891 to 1902, and in this capacity negotiated the preliminaries of peace between the United States and Spain.

CAMBON, PIERRE JOSEPH (1754-1820). A French financier and politician. He was born in Montpellier, and was a merchant there at the beginning of the French Revolution. He was a member of the Legislative Assembly in 1791 and of the Convention in 1792. From the outset he devoted himself to financial questions, of which he speedily showed himself a master. As France, during the Revolution, was at war with all Europe, vast sums of money had to be raised. The financial condition was desperate, due to the excessive number of assignats in circulation and their consequent depreciation, and also to the general ignorance as to the actual debt of the country. Cambon proposed to prepare a 'grand livre' of the national debt. This plan was set forth in his great *Rapport sur la dette publique* (August 15, 1793), on which his fame as a financier chiefly rests. Cambon was a member of the first Committee of Public Safety. Throughout the Reign of Terror he was the real administrator of the finances. He opposed the financial measures of Robespierre, who attacked him by name in the Convention. Later he was arrested for having defended Collot d'Herbois and other members of the Committee of Public Safety, but was released in the general amnesty of 1795. In 1815 he sat in the Chamber during the Hundred Days. He was finally exiled as a regicide in 1816, and he died in Brussels.

CAMBON, PIERRE PAUL (1843—). A French legislator and diplomat, born in Paris. He became chief of Cabinet of the Prefecture of the Seine, under Jules Ferry, in 1870, and thereafter Secretary-General of the departments of Alpes-Maritimes and Bouches-du-Rhône (1871), and prefect of Aube (1872). Subsequently he held several other prefectures, but in 1882 abandoned the legislative for the diplomatic service, and after filling the position of Minister of France to Tunis, was successively appointed Ambassador to Madrid (1886), Constantinople (1890), and London (1898).

CAM'BORNE. A market-town of Cornwall, England, 10 miles west-northwest of Falmouth (Map: England, A 6). It is surrounded by very productive copper, tin, and lead mines. Its parish church is a handsome Gothic structure. Population, in 1901, 14,700.

CAMBRAI, or **CAMBRAY,** käɴ'brâ'. A town of France in the Department of the Nord (French Flanders), situated on the right bank of the Scheldt, 121 miles by rail north-northeast of Paris (Map: France, K 1). It is well built, and has a fine cathedral containing the remains of Fénelon, Archbishop of Cambrai, a magnificent town hall, and a number of other fine buildings. Cambrai is the seat of an extensive textile industry, and contains, besides, a number of sugar-mills, soap-factories, tanneries, and many other industrial establishments. Cambrai was known to the Romans under the name of Camaracum, and it was then one of the chief cities of the Nervii. It was fortified by Charlemagne, and was long governed by its own bishops. Here was formed in 1508 the celebrated League of Cambrai, consisting of the Pope, the Emperor of Germany, and the kings of France and Spain, whose object was the destruction of the Republic of Venice. Here, also, was concluded in 1529 the peace between Francis I. and Charles V., known as the *Paix des Dames* ('Ladies' Peace'), the preliminary negotiations having been conducted by Louise, mother of the French King, and Margaret, aunt of the German Emperor. Cambria has been in possession of France since 1677. Consult Dinaux, *Bibliographie Cambrésienne* (Douai, 1822). Population, in 1896, 14,306.

CAM'BRIA. The ancient name of Wales, the Britannia Secunda of the Romans. The name is derived from that of the Cimbri, or Cymri, by which the Welsh have always called themselves.

CAM'BRIAN SYSTEM. The name given to the great series of sedimentary deposits which comes next in order of succession to the Archæan, the lower beds of the Cambrian system resting unconformably on its upturned edges. The name Cambrian, derived from Cambria, the ancient name of Wales, in which country the beds of this age were first recognized, was given by Adam Sedgwick, an eminent English geologist, who devoted his life to the study of this formation. The upper limits of the Cambrian, as there studied, were in much dispute for a time, since many of the beds placed by Sedgwick in the Upper Cambrian were claimed by Murchison to be Lower Silurian; and this, indeed, was subsequently found to be the case. To these disputed beds the name Ordovician (q.v.) was given by Lapworth (1879). Fossils are very scarce in the Cambrian rocks in many places, but in other localities, where different members of the formation are exposed, life remains abound, showing a profusion of marine invertebrates and plants of low order. The animal remains include, in order of their importance, crustaceans, brachiopods, pteropods, worms, gastropods, hydrozoans, echinoderms, sponges, corals, lamellibranchs, and cephalopods. All of these, except the cephalopods, were represented in the earliest periods of the Cambrian system.

While the great thickness of Cambrian strata indicates a long period of sedimentation, still the great changes that we find in the faunas in passing from one division of the Cambrian system into another are considered remarkable, since they indicate a most complete revolution in the life forms in any one region. Thus, of the many trilobites found in the Lower Cambrian, but few are known in the middle division; and these, in turn, differ markedly from those in the Upper Cambrian. The reason for this absence of transitional types may be due to the fact that the intermediate beds containing them have not yet been discovered. The trilobites were a prominent feature of the Cambrian system, and varied much in size, from under an inch, like the small, blind ones, agnostus, to others having a length of two feet, as paradoxides. No vertebrate remains have been found. There is no evidence of invertebrate life that existed on land in fresh water, although it is quite possible that some of the mollusks found may have lived in estuaries of brackish water, for the character of many of the sedimentary rocks of Cambrian time, such as grits, with ripple-marks, is indicative of shallow-water conditions.

The thickness of the Cambrian system is variable. In Newfoundland it is about 6000 feet; in Vermont and eastern New York, 7000 feet; in British Columbia, 10,000 feet. The Cambrian rocks include sandstones, limestones, shales, slates, marbles, and quartzites, with occasional igneous rocks, as in the Lake Superior region and southeastern Pennsylvania, and also in Great Britain. The metamorphosed Cambrian rocks are found in areas of much folded strata. In America the Cambrian rocks have been classified under: (1) *Georgian* series, or Lower Cambrian, a local development in Michigan being known as the *Keweenawan*, or *Keweenian*: in this the trilobite olenellus is often common. (2) *Acadian*, or Middle Cambrian, in which the tribolite paradoxides is abundant in places. (3) *Potsdam*, or Upper Cambrian.

In North America Cambrian rocks are found in Newfoundland, Nova Scotia, New Brunswick, and Canada; also in Vermont, Massachusetts, Maine, New Hampshire, Rhode Island, New York, New Jersey, Pennsylvania, Maryland, Tennessee, Alabama, Georgia, Michigan, Wisconsin, North Dakota, California, Colorado, Arizona. In foreign countries, they are known in Great Britain, Germany, Bohemia, Scandinavia, France, Spain, Sardinia, China, Australia, and India. The British, Bohemian, and Scandinavian areas are of classic interest. The economic products of the Cambrian system in the United States include the slates (q.v.) and limonite ore (q.v.) of the Appalachian States, sandstone in New York, and copper ores in Michigan.

Consult: Walcott, *Tenth Annual Report United States Geological Survey* (Washington, 1888); *Bulletin 81, United States Geological Survey* (Washington, 1891); Dana, *Manual of Geology* (New York, 1895); Geikie, *Text-book of Geology* (London, 1893). See GEOLOGY; POTSDAM SANDSTONE.

CAMBRIC, kām′brik. A general term applied to the finest and thinnest of linen fabrics. It is said to be derived from Cambrai (France), where such goods were first made. Some of the finest cambrics of the present day are produced in Switzerland. Scotch cambric is really a muslin, and is made of cotton with the fibre twisted very hard, to imitate real or linen cambric.

CAMBRIDGE, kām′brīj (Cam bridge; Neo-Lat. *Cantabrigia*). The county-town of Cambridgeshire, England, situated on the Cam, about 57 miles north-northeast of London (Map: England, G 4). The town, as a whole, is less picturesque than its rival, Oxford, and its main street, Trumpington, does not compare favorably with the famous High Street of Oxford. On the other hand, many of its college buildings are, from an architectural standpoint, the equal of any which its sister university possesses; and the beautiful lawns and gardens behind the colleges, traversed by the Cam, familiarly known as 'the Backs,' certainly equal in beauty the justly praised Christ Church Meadow of Oxford. Apart from the colleges and the buildings immediately connected with them, Cambridge possesses few interesting features. The Church of the Holy Sepulchre is worthy of note as being one of the four existing round churches in England. Cambridge is a Parliamentary borough, and sends one member to the House of Commons. The city maintains a large public library and makes large grants to a number of schools. Its water, gas, and electric-light plants are in the hands of private companies. Its drainage and sewerage system has been recently improved. Population, in 1891, 37,000; in 1901, 38,400. Cambridge, probably on the site of the *Camboritum* of the Romans, takes its name from the river Cam, which was anciently, and is still in its upper reach, called the Granta. To the Saxons, Cambridge appears to have been known as Grantabrydge. In 870 the Danes ravaged the country hereabouts, and are said to have destroyed the town. William the Conqueror built a castle here, and the town received its first charter from Henry I. in 1118. King John, in 1200, granted a charter to the town, permitting it to have a guild of merchants, and in 1207 confirmed the burgesses in their privileges in perpetuity. See CAMBRIDGE, UNIVERSITY OF.

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CAMBRIDGE. A village and county-seat of Henry County, Ill., 30 miles southeast of Rock Island, on the Rock Island and Peoria Railroad (Map: Illinois, B 2). It is the centre of a fertile agricultural region, and exports live stock and grain. Population, in 1890, 940; in 1900, 1345.

CAMBRIDGE. A city and county-seat of Dorchester County, Md., 60 miles southeast of Baltimore, on the Choptank River, and on the Seaford and Cambridge Railroad, which connects with the Philadelphia, Wilmington and Baltimore at Seaford, Del. (Map: Maryland, N 6). It is the centre of a rich agricultural district, and has an extensive oyster-canning industry, and important manufactures of underwear and lumber. Settled in 1684, Cambridge was incorporated as a Colonial town early in the Eighteenth Century; the present city charter dates from 1900. Under its provisions, the mayor is elected every two years by the city council, which consists of the executive and four aldermen, chosen by the city wards. Population, in 1890, 4192; in 1900, 5747.

CAMBRIDGE. A city, the seat of Harvard University, and one of the county-seats of Middlesex County, Mass. It is on the Charles River opposite Boston, of which it is practically a suburb, being connected by several bridges (Map: Massachusetts, E 3). It is entered by the Boston and Albany and the Boston and Maine railroads, and electric railroads connect with Boston and adjacent towns. The historic divisions are still locally known as Old Cambridge, North Cambridge, East Cambridge, Cambridgeport, and Mount Auburn. Cambridge is irregular in shape, generally level in surface, and covers an area of about 6½ square miles. Its streets and avenues are shaded with beautiful old trees, and there are many handsome residences and well-preserved Colonial mansions, among them the Craigie House, occupied by General Washington, and later the home of the poet Longfellow, now fronted by a memorial park, and Elmwood, the dwelling of James Russell Lowell. The principal features of Cambridge are Harvard University (q.v.), with its ample grounds and many buildings, Radcliffe College (q.v.), the buildings of the Protestant Episcopal Divinity School, the First Parish Church (Unitarian), the Shepard Memorial Church (Congregational), commemorating Rev. Thomas Shepard (q.v.), and Christ Church (Protestant Episcopal). The city common contains a soldiers' monument and a statue of John Bridge. Less than a mile from the university are the Harvard Observatory and the botanical gardens of eight acres, filled with a great variety of trees, shrubs, and plants, especially of native species. Mount Auburn Cemetery, partly in Cambridge, one of the most beautiful places of burial in the country, contains the graves of Longfellow, Lowell, Phillips Brooks, and many other distinguished men. Among prominent buildings, other than those already mentioned, must be noted the public library, Cambridge Hospital, the Latin School, High School, Rindge Manual Training School, the city hall, the court-house, jail, and other county buildings. Cambridge has a fine system of public parks; besides Interior Parks, the River Parks include the entire river-front, and add greatly to the beauty of the city.

Among the industrial establishments of Cambridge are the Riverside, Athenæum, and University presses, the latter dating from the earliest printing house in America, founded in 1639, which are all widely known. There are also large foundries and machine-shops, meat-packing houses, and extensive manufactures of soap and candles, pianos and organs, furniture, confectionery, rubber goods, boilers, chemicals, astronomical instruments, carriages and automobiles, bricks, and many other articles. The industries are centred principally in Cambridgeport and East Cambridge.

Cambridge is governed, under the charter of 1891, by a mayor, elected annually, and a bicameral municipal council, of which the board of aldermen is elected at large and the common council by wards. In the administrative departments, the majority of officials are appointed by the mayor, subject to the confirmation of the board of aldermen; the city council, however, elects the city clerk and assistant, treasurer, auditor, messenger, clerk of committees, solicitor, and overseer of the poor; and members of the school board are chosen by popular election. Cambridge owns and operates its water-works. Some features of municipal politics deserve mention. Cambridge is noted as the largest city in the world with no open saloons, and the no-license system, as operated under the Massachusetts law, seems well established. Municipal elections are conducted by local parties entirely independent of national and State organizations.

History. Cambridge originally included the present towns of Lexington, Arlington, and the Brighton district of Boston. It was settled at Newtowne, in 1630, by Governor Winthrop and others, who intended it to be the chief place of the Colony, but found the peninsula of Shawmut (Boston) better adapted for commerce and for defense against the Indians. Resettled in 1631, it received, in 1633, its first pastor and teacher, Rev. Thomas Hooker (q.v.) and Rev. Samuel Stone, who removed with their congregation to Connecticut in 1636, largely owing to ecclesiastical differences. In 1637 the General Court ordered that the college it had previously decided to found be established at Newtowne, and in 1638 that Newtowne become Cambridge. In the same year the first class began its studies, and the name Harvard College was given to the modest institution. (See Harvard, John.) During the time Boston was held by the British Army (1775-76) Cambridge was occupied by the American Army, and Washington assumed command in 1775 under a large elm, which is still standing. The city charter of incorporation was granted in 1846. Cambridge claims to have enlisted the first company of volunteers for service on the Northern side at the outbreak of the Civil War, and during that conflict it furnished 4588 men to the Union army and navy. The city has been the home of many famous literary men, notably of Longfellow, Lowell, and Holmes.

Population, in 1790, 2115; in 1830, 6072; in 1850, 15,215; in 1880, 52,669; in 1890, 70,028; in 1900, 91,886, including 30,500 persons of foreign birth and 3900 of negro descent.

Consult: Paige, *History of Cambridge* (Boston, 1877); Hurd (editor), *History of Middlesex County* (Philadelphia, 1890); and Powell, *Historic Towns of New England* (New York, 1898).

CAMBRIDGE. A village in Washington County, N. Y., about 30 miles northeast of Albany, on the Delaware and Hudson Railroad (Map: New York, G 2). It is noted principally as the seat of the Cambridge Valley Agricultural and Stockbreeders' Association. Population, in 1890, 1598; in 1900, 1578.

CAMBRIDGE. A city and county-seat of Guernsey County, Ohio, 85 miles east of Columbus, on the Baltimore and Ohio and the Pennsylvania railroads (Map: Ohio, G 5). The surrounding region has deposits of fine pottery clay, natural gas, coal, and iron; these with the manufacture of various products of iron and steel, glass, and pottery, are the principal fields of industry. The city owns and operates its water-works, and has a public library. Settled in 1806, Cambridge was incorporated in 1837. It is governed by a charter of 1893 which provides for a mayor, elected biennially, and a city council. Population, in 1890, 4361; in 1900, 8241.

CAMBRIDGE, Ada (1844—). The pseudonym of Mrs. George Frederick Cross, novelist, born at Saint Germains, Norfolk, England, and after 1870 a resident of Victoria, Australia. She has become widely known by *A Marked Man* (1891); *The Three Miss Kings* (1891); *A Little Minx* (1893); *At Midnight* (1897); *Materfamilias* (1898); *Path and Goal* (1900); and *The Devastators* (1901). She has also written several poems displaying lyrical power. See Australian Literature.

CAMBRIDGE, George William Frederick Charles, second Duke of (1819-1904). An English soldier, son of Adolphus Frederick, Duke of Cambridge. He was born in Hanover, and succeeded to his title in 1850. In 1837 he was colonel, and in 1854 lieutenant-general, commanding the first division sent in aid of Turkey against Russia. He led the troops at the Alma and at Inkerman. In consequence of ill health he returned to England, and in 1856 became acting commander-in-chief of the British Army. He was made field-marshal, and in 1887 received the patent of commander-in-chief. In 1895 he was retired, and succeeded by Lord Wolseley (q.v.).

CAMBRIDGE, University of. The younger of the two ancient seats of learning in England. The origin of the university, like that of Oxford, is obscure. The old Benedictine establishment in Cambridge was swept away by the Danish invasions, and the university cannot boast the continuous existence beyond the Conquest assigned to it by the older writers. Though we may disregard the various fables of its foundation by a Spanish King, Cantaber, by King Arthur, by a Saxon King, Sigebert, and by Gislebert and his three companion monks of Croyland, it seems very probable that the university originated in some local educational movement during the Twelfth Century, augmented, as time went on, by such influences as the migration of Oxford students thither in 1209, and of students from Paris in 1229. As early as 1231 a chancellor is mentioned in a royal writ, and two years later the university received Papal recognition. Following the example of Paris, Cambridge maintained, besides the trivium and quadrivium (q.v.), or faculty of arts, the advanced faculties of theology, civil and canon law, and medicine. It was, however, not recognized formally as a Studium Generale until the Papal bull of 1318. Like Paris, too, Cambridge was governed by a guild or corporation of masters, resident teachers called regents, with whom resident masters not engaged in teaching, called non-regents, were later associated. The presiding officer, called the chancellor, was elected by the regents. To this new university the mendicant orders came very early, the Franciscans about 1224, the Dominicans half a century later. These, as well as other bodies of monks and of friars, established houses for their members, and for a time played a considerable part in university affairs, but their permanent influence was, save perhaps in one direction, not great. In the earlier stages of the university the students, here as elsewhere, had boarded and lodged independently. With the increasing size and importance of Cambridge there now arose, alongside these religious houses, voluntary associations of students, living together in independent hostels or halls. Private benefactors, finding in these fit subjects for encouragement, presently began to endow these halls, or to establish 'colleges,' often by the consolidation of several halls. This new form of institution, providing for the support of deserving students, combined the idea of supervision and support of the religious houses, with that of the independence of the halls. The collegiate system, beginning on the Continent, seems to have been carried to Cambridge by way of Oxford, and, though not original with either, has survived in them alone, giving them their unique place among the universities of the world. The first of the Cambridge colleges, Peterhouse, a purely academic organization with no monastic discipline, was founded in 1284 by Hugh of Balsham, Bishop of Ely, and from this time for almost exactly three centuries the foundation of colleges continued. With one exception, the Cambridge of to-day is formed of the colleges established during that period. In this, Cambridge differs much from Oxford, for though four colleges were founded in Oxford in the Seventeenth and Eighteenth centuries, the only permanent collegiate foundation in Cambridge since 1596 is Downing College, established in 1807. The short-lived Cavendish College, Selwyn College (1882), a 'hostel,' and the foundations for women, Girton (1869) and Newnham (1875), are not formally connected with the university. (A list of colleges, with the dates of their foundation, will be found at the end of this article, and separate notices of the colleges under their names in the body of the Encyclopædia.)

The university, thus constituted, played a great part in the Reformation. Humanism entered Cambridge early, associated with the names of Sir John Cheke, Sir Thomas Smith, and Bishop Fisher. Of those closely associated with the Reformation, Erasmus was Lady Margaret professor of divinity from 1511 to 1514, and translated the New Testament here. Here, too, William Tyndale and Hugh Latimer began their labors in the new cause, and from here came Cranmer, who, in more ways than one, shaped the English Reformation in later years. The Royal Injunctions of 1535 mark an epoch in the history of the university, for by them the new learning was finally established. The study of the canon law was discontinued, public lectures in Greek and Latin were established in the colleges, the Bible, studied in the light of the new learning, replaced the Sentences, and the humanistic method took the place of the scholastic. As elsewhere, the recognition of the royal supremacy was enforced here, and with these sweeping changes, and the replacing of the clerical element in the university by lay students, the mediæval history of Cambridge may be said to close and its modern history to begin.

For the moment, however, here, as in all universities which took a leading part in the Reformation, the immediate effect of that movement was disastrous. It was not until the reign of Elizabeth that Cambridge began to recover from the shock. Then it became the stronghold of advanced Puritanism, as it had earlier been of advanced Protestantism, particularly under the influence of Cartwright, who was finally deprived of his official position in the university on this account. Largely owing to the disturbances arising from this, new statutes were enacted in 1570, which lasted till the middle of the Nineteenth Century. By these the government of the university was practically vested in the heads of the colleges, who alone elected the vice-chancellor and the *Caput*, or supervising board. This turned Cambridge into a close corporation, a misfortune not bettered by the fact that with it went a tendency to turn the university into a school of divinity. The reign of James I. is memorable as the period when the university was granted the privilege of returning two members to Parliament, which it still enjoys. The later Seventeenth Century saw the rise of the school of Cambridge Platonists, and, chiefly by the influence of Isaac Newton and Isaac Barrow, the beginnings of that tendency toward the cultivation of mathematics and the natural sciences, which is still one of the chief distinctions between Cambridge and Oxford. During the Eighteenth Century, until the rise of the Evangelical School, the same mediocrity and apathy in religious matters prevailed here as elsewhere, but scholarship was improved by the evolution of the tripos into something like its present position. The Nineteenth Century saw sweeping changes, the reorganization of colleges and university, greater freedom in academic matters, the abolition of religious tests, and a more liberal idea of the importance of certain studies as well as of the relations between certain lines of work. Between 1840 and 1850 several colleges secured new charters from the Crown, and in the latter year a commission began a revision of the statutes, which led to the replacing of the Elizabethan statutes by those of the new commission in 1858. These were in turn altered in 1869 and 1871-72, and in the latter year another commission was appointed, on the strength of whose report (1874), and of a memorial issued by an influential body in the university, the Universities of Oxford and Cambridge Act was passed in 1877, and approved by the Crown in 1882. This effected a reorganization of the entire university system. Meanwhile, various internal changes had been taking place. To the older triposes of classics and mathematics, were added the law tripos in 1858, divided into law and history in 1872, the Semitic language tripos in 1878, the Indian language tripos in 1879, the mediæval and modern language tripos in 1886.

The university at present is a self-governing corporation, administered by a senate, consisting of all doctors and masters, of whom only those in Cambridge have electoral rights. The Council of the Senate, consisting of the chancellor, the vice-chancellor, four heads of colleges, four university professors, and eight associates from the senate, prepares agenda for the senate, chooses the vice-chancellor, and in general carries on the ordinary administration of the university. The funds are managed by a financial board, the curriculum is arranged by a general board of studies, separate departments being in the hands of sub-committees, or special boards. The chancellor is an honorary official, as at Oxford, usually some dignitary of the realm, as are also the steward and the deputy steward. The vice-chancellor is the real head of the university, and is assisted by deputies and by two proctors, who, besides their duties in the senate, have charge of university discipline. There are, moreover, two esquire bedells, the public orator, a commissary, an assessor, and the registrar, who has charge of records. There are at present seventeen colleges besides the two foundations for women, several special semi-collegiate institutions not a part of the university, and a body of non-collegiate students. The university proper, as distinguished from the colleges, is possessed of several important institutions. The Fitzwilliam Museum, founded by Viscount Fitzwilliam in 1816, is one of the largest and finest institutions of its kind in England. The university library contains some 200,000 volumes, and a considerable collection of MSS. There are also fine geological and anatomical museums, an excellent observatory, and the university practically controls the extensive printing and publishing establishment of the Pitt Press, as well as Addenbrooke Hospital. Examinations are held and degrees are conferred in the Senate House, which contains also the public offices of the university, and is the meeting-place of the senate.

The existence of the colleges in connection with the university forms a peculiar, and, save for Oxford, a unique educational organization, not easy for an outsider to understand. Briefly, it may be said that the college and the university are separate corporations, in large measure independent of each other, but connected very closely by the fact that they form interacting parts of an educational system, and that they are composed of, and managed by, the same individuals. The university is essentially an examining and degree-conferring body, which examines the candidate at entrance, during his residence, and at the conclusion of his work, and confers degrees on those men who meet its requirements. It regulates the system of education, with respect not only to subjects, but also to quality, and quantity of preparation, it enforces general discipline, and it offers certain educational advantages in its lectures, its libraries, its collections, and similar provisions. The college, on the other hand, receives the entering student, provides him with lodgings and meals, service, and the like, prepares him, by its tutors, for the university examinations, affords him society and recreation, and exercises somewhat more than paternal oversight of his actions. The administration of the colleges is in the hands of a master and fellows, from among whom are chosen the college officials, dean, bursar, and the like, as well as the teaching or tutorial force of the college. These men, as masters of arts of the university, form a great part of the senate, and so virtually govern it as well as the colleges.

Undergraduate life at Cambridge differs somewhat from that at Oxford, and very greatly from that in the United States. Formerly, all men belonged to colleges, and though since 1869 it has been possible for men to belong to the university without being members of a college, the class of non-collegiate students thus created has never been very large, most undergraduates being connected with a college. Unlike Oxford, certain older distinctions among these are still maintained at Cambridge. Four classes of students are recognized: fellow-commoners, youths of rank or fortune, with special privileges; scholars, chosen by examination, and generally receiving some financial aid, as well as certain privileges; pensioners, or ordinary undergraduates; and sizars, poor students, partly or wholly supported by the college. The great majority of men live in college, though many of those belonging to colleges, and all the non-collegiate students, live in lodgings in the town. There are three terms in the university year, the Michaelmas, or October term; the Lent, or winter term; and the Easter, or spring term. These nominally include 227 days, but actually average each about eight weeks of required residence, leaving long vacations, during which much of the actual work, or 'reading' as it is called, is done. The students are under the direct charge of the tutors, who maintain personal relations with each man under their charge and supervise his work, directing him in a way not known to the educational system in the United States with its large classes and entire or partial absence of personal relation between student and instructor.

The degree of B.A. may be conferred, after the required examinations have been passed, at the end of nine terms or three years of residence. The degree of M.A. is attainable four years later, not in course, but in consideration of the pursuit of literary or scientific work. The university confers also degrees in law, theology, medicine, music, and an advanced degree in science, all of these latter being dependent on the possession of the bachelor's degree. Certain honorary degrees are also conferred, notably that of Doctor of Laws (LL.D.).

There are no exact equivalents at either of the English universities for the course of study common in the United States. The system of education is based upon, and conditioned by, the examinations which a candidate for the degree of B.A. must take. These are three in number. The following, from the 1900-01 regulations, will give the best general idea of the system. The 'previous' examination consists of two parts, one of the Gospels (Greek), one Latin classic, one Greek classic, one translation of English into Latin, and a paper on Latin and Greek accidence and syntax, forming the first part. The second consists of Paley's *Evidences*, geometry, arithmetic, elementary algebra, and an English essay. Candidates for honors must take the additional subjects of mechanics, French, and German. The second or 'general' examination consists of two parts, the first including one Greek classic, one Latin classic, algebra, elementary statics, a translation of English into Latin prose; the second, the *Acts of the Apostles* (Greek), some portion of English history, an English essay on a subject connected with the history offered, elementary hydrostatics, and some play of Shakespeare or a portion of Milton's works. The special or final examination may be taken in any one of the following subjects: theology, logic, political economy, law, history, chemistry, physics, geology, botany, zoölogy, physiology, mechanics, and applied science, music, modern languages, mathematics, or classics. For those men who are candidates for honors, special examinations, called triposes, are provided in mathematics, classics, moral sciences, natural sciences, law, history, theology, Oriental languages, mediæval and modern languages, and mechanical sciences. The successful candidates in the triposes are arranged in three classes, according to their standing, and have their names printed in the Calendar. In all save the mathematical tripos, these divisions are called simply first, second, and third class. The honor men in mathematics, however, are known as wranglers, senior optimes, and junior optimes, and the head of the first list, the best man of the year, is known as the senior wrangler.

Women are admitted to the examinations, and have their names appear in the Calendar, next to the tripos lists, with their rank attached, but are not allowed degrees.

For further information on the university there are a number of books available. The *History of the University of Cambridge*, by J. Bass Mullinger, in two volumes (Cambridge, 1873-84), covers, so far, only the period to 1625, but is the best as well as the fullest account up to that time. There is an excellent, though briefer, account of the university and colleges before 1500, in H. Rashdall, *Universities of Europe in the Middle Ages* (Oxford, 1895). Official information may be obtained from the Cambridge University Calendar, and from the announcements of lectures and such publications as are issued from time to time. Much incidental information may be obtained from Sir G. M. Humphrey's *Guide to Cambridge*.

See, also, the articles in the present work on UNIVERSITY; EDUCATION; NATIONAL EDUCATION, and on the various colleges under their names.

The colleges in the order of their foundation, with dates and founders, are as follows:

Peterhouse, or Saint Peter's College, 1284, by Hugh of Balsham. Clare, 1326, by Elizabeth, Countess of Clare. Pembroke, 1347, by Mary de Saint Paul, Countess of Pembroke. Gonville and Caius, 1348, by Edmund Gonville; refounded by William Bateman, 1353, and later by John Caius, 1558. Trinity Hall, 1350, by William Bateman, Bishop of Norwich. Corpus Christi, 1352, by Guilds of Corpus Christi and Virgin Mary. King's, 1441, by Henry VI. Queen's, 1448, by Margaret of Anjou; refounded, 1465, by Elizabeth Woodville. Saint Catharine's, 1473, by Robert Wodelarke. Jesus, 1496, by John Alcock, Bishop of Ely. Christ's, 1505, by Margaret of Richmond and Derby. Saint John the Evangelist, 1511, by Margaret of Richmond and Derby. Magdalene, 1519, by Thomas, Baron Audley of Walden. Trinity, 1546, by Henry VIII. Emmanuel, 1584, by Sir Walter Mildmay. Sidney Sussex, 1596, by Lady Frances Sidney, Countess Dowager of Sussex. Downing, 1800, by Sir George Downing.

Public Hostels.—Cavendish College, extinct, 1876-91. Selwyn College, 1882, by subscription. Ayerst Hall, extinct, 1884-96.

CAMBRIDGE PLATFORM. See CONGREGATIONALISM.

CAMBRIDGE PLATONISTS. A school of writers in the English Church, members of the University of Cambridge, in the latter part of the Seventeenth Century, who sought to exhibit the entire rationality of the doctrines of the Christian religion, and drew largely from Plato in execution of this purpose. They were the liberals of their age, and were often styled 'Latitudinarians.' There had been a liberal party in the early part of the century, but its liberalism was concerned with Church polity. It sought to maintain a comprehensive Church. The liberalism of the Cambridge Platonists took another direction, for they sought to emphasize the great Christian doctrines to the neglect of minor matters, often made the instruments of sectarian exclusiveness, and to show that these great doctrines were identical with the teachings of the soundest philosophy. With a single exception (More, educated at Emmanuel College, and of the Puritan party), they worked in great harmony: while they naturally belonged to the party that had formulated the Puritan theology in the Westminster Confession, they were led, by the prevailing laxity of morals and the multiplication of sects, to endeavor to overcome the schism between divinity and morals. They were powerfully influenced by the philosophical currents of their time, particularly by the writings of Descartes (Cudworth and Keon), less so by those of Bacon. But as a school, they were formed by the study of Plato, and of the Christian Fathers who followed the Platonic course of thought—those of Alexandria. On the other hand, the school was largely determined by its fundamental antagonism to the doctrines of Hobbes, who founded his philosophy on the senses, and ignored the moral and religious postulates of human nature. Against this philosophy the Cambridge Platonists waged uncompromising and unceasing war. Their liberalism, however, brought them into suspicion, and they were generally regarded with disfavor.

The principal representatives of this school were the following:

Benjamin Whichcote, born in Shropshire, March 11, 1609-10, died at Easter, 1683, in Cambridge. His father was apparently a country squire, the owner of Whichcote Hall. He was sent to Emmanuel College in 1626, took his B.A. in 1629, and his M.A. in 1633, when he became fellow of his college. In 1636 he was ordained, in 1643 presented to the living of North Cadbury, where he probably married. He was made provost of King's College, Cambridge, in 1644, and continued to occupy this post till the Restoration, 1660, when he was displaced by the royal order. His great work here was performed as a teacher, and particularly as the preacher of the Sunday afternoon lecture in Trinity Church. In these sermons he sought to lift the plane of current religious thinking, and he exercised the great influence which belongs to those whom the sight of a receptive audience quickens to eloquence. After his removal he occupied two different charges in London, spending his last fifteen years in Saint Laurence Jewry, where he was attentively heard by a small but select congregation. He published nothing himself. After his death a few sheets of *Select Notions* were published in 1685, a *Treatise of Devotion* in 1697, then *Select Sermons* (1698) with a preface by the Earl of Shaftesbury (reprinted, Edinburgh, 1742); and in the years 1700 ff. a new edition of the sermons from the author's own MSS. in four volumes, with a volume of *Aphorisms* (1753).

John Smith, one of the most gifted of the school, born at Achurch, Northamptonshire, 1618, died August 7, 1652, has left behind almost no materials for a biography. He entered Emmanuel College, Cambridge, in 1636, took his B.A. in 1640, and his M.A. in 1644, at which time he was chosen fellow of Queen's College. His health seems to have been precarious from the first. His labors were principally confined to his office as teacher, for which he had remarkable qualifications. His preaching was with a rare degree of eloquence, which can still be felt in the *Discourses* (1660), which remain to us. He gained much local fame as a lecturer on mathematics. His personal character was such as to excite the admiration and love of his associates in a remarkable degree. As a founder of the school, his special service was in developing the foundations of a Christian philosophy.

The two most famous of the Cambridge Platonists are *Ralph Cudworth* and *Henry More*, whose lives will be found in their alphabetical places in this Encyclopædia. More obscure were *Nathaniel Culverwel*, of a genius and eloquence like Smith's, who entered Emmanuel in 1633 and took his M.A. in 1640, was a fellow and preacher in the College Chapel, died about 1651, and whose *Discourse of the Light of Nature* was published 1652; *John Worthington*, a native of Manchester, educated at Emmanuel College, Master of Jesus College till the Restoration, then held a succession of livings, and finally Hackney, where he was chosen lecturer in 1670, his *Discourses* being published in 1725, and *Miscellanies* in 1704; *George Rust*, fellow of Christ's College in 1657, after the Restoration in Ireland, where, in 1667, he became Bishop of Dromore, died in 1670, his *Discourse of Truth* appearing in 1682; *Simon Patrick* (1626-1707), Bishop of Chichester, 1689, and of Ely, 1691; *Edward Fowler*, took his M.A. in Trinity College, Cambridge, about 1655, finally Bishop of Gloucester; *Joseph Glanvill* and *John Norris*, both Oxford students, but impregnated with the spirit of the Cambridge Platonism. Consult John Tulloch, *Rational Theology and Christian Philosophy in England in the Seventeenth Century*, Vol. II. (Edinburgh, 1872).

CAMBRIDGESHIRE. An inland agricultural county of England (Map: England, G 4). Area, 820 square miles. About three-fourths of the county consists of arable land, meadow, and pasture, the rest being fens. The chief rivers are the Ouse, which crosses the middle of the county from west to east, with its tributary the Cam, the Nene, which borders the county on the north, and the Lark. These are all navigable to a certain extent. County town, Cambridge. Population, in 1891, 188,961; in 1901, 190,700. Consult Conybeare, *History of Cambridgeshire* (London, 1897).

CAMBRONNE, käɴ'brūn', Pierre Jacques Etienne, Count of (1770-1842). A brave and blunt soldier of Napoleon, most widely known, perhaps, for a phrase he never uttered. He was born at Saint-Sébastien, near Nantes, fought in the Vendée in 1792, distinguished himself at Zurich in 1799, and participated in the campaigns of the Empire between 1806 and 1813.

He went with Napoleon to Elba, and at Waterloo led a division of the Old Guard. There, after fighting like a madman, he is reported to have cried in answer to General Halkett's demand for his surrender, *La garde meurt et ne se rend pas* (The Guard dies, but never surrenders). Cambronne did not say this, however, and he did surrender. Severely wounded, he was taken to London, but bravely returned to stand his trial before a court martial, which acquitted him. In 1820 he was restored to his rank in the army.

CAM'BUSCAN'. The king of Tartary in Chaucer's *Squire's Tale.* The King of Arabia and India sends him a brazen horse, a mirror, a ring, and a sword of magic properties. He is the father of two sons, Algarsif and Camballo, and of a daughter, Canace. The story stops after a sort of prologue which promises adventures to come, more especially for Camballo and Canace; so the later history of Cambuscan and his presents is unknown.

CAMBYSES, kăm-bī'sēz, **I.** (Gk. Καμβύσης, Old Pers. Inscr. *Kambujiya*, of uncertain etymology). The father of Cyrus the Great (q.v.) and son and successor of Teispes in the line of Persian kings (Herod. vii. 11, and the Cyrus Cylinder).

CAMBYSES II. (? -B.C. 522). King of the united realm of the Medes and Persians from B.C. 529 to 522. He was the grandson of Cambyses I. and son of Cyrus the Great. Ascending the throne on the death of his father, he at once took the reins of government in his hands. His brother, Smerdis (Old Pers. *Bardiya*), was made viceroy of the eastern provinces of Iran. Cambyses's first and chief design was the conquest of Egypt. He invaded this country with his armies, and in B.C. 525 defeated Psammetichus, the King of Egypt, at Pelusium. Memphis, the capital, fell in the following year, B.C. 524, and Cambyses was soon master of the entire fertile valley of the Nile. Nubia was also subjugated, but not without great loss to his forces, and an attempt to conquer the Ethiopians proved a disastrous failure. An expedition likewise against Carthage had to be abandoned because the Phœnicians refused to lend their naval power. It was now that Cambyses received news that the throne of Persia had been seized, during his absence, by a Magian priest Gaumata, the Pseudo-Smerdis. The usurper impersonated Bardiya, or Smerdis, Cambyses's brother, who had been assassinated, though the people did not know it, at the instigation of Cambyses himself. Startled by this bold impersonation of one whom he believed to be dead, the guilty and crime-laden Cambyses hastened to retrace his steps to Persia, but died on the way, B.C. 522, at Ecbatana, which Herodotus (iii. 62-64) calls a city of Syria, but Josephus names Damascus. The oracle of Buto had prophesied he would die at Agbatana, but Cambyses always supposed the Median Ecbatana to be meant by this. In certain respects, the accounts of Herodotus (iii. 64) and Ctesias differ as to the manner of his death, but both attribute it to an accidental self-inflicted wound. In the great Behistun inscription (i. 43) Darius says that Cambyses died by a death self-inflicted, but the word *urā-maršiyuš*, lit. 'self death,' seems rather, though not necessarily, to imply suicide. Regarding the character of Cambyses, if we follow Herodotus, his behavior in Egypt was little short of that of a madman. His cruelties and sacrilegious acts were atrocious. He is said to have violated the tombs of the Egyptians, and even to have put some of their leading men to death. In an outrageous manner he stabbed the sacred bull of Apis so that it died, and he caused the ministering priests to be scourged (Hdt. iii. 29). But it must be added that this account is not easy to reconcile with an existing stele on which Cambyses is portrayed as giving an honorable burial to the dead god Apis. On the whole, however, there can be no doubt that he was a dissolute and inhuman ruler. See CYRUS; DARIUS; MEDIA; PERSIA.

CAMBYSES, KING OF PERSIA. A tragedy by Thomas Preston, published in London in 1569 by John Allde. An undated edition was later brought out by Edward Allde. It has been reprinted by Hawkins and Dodsley. It is important as marking the transition between the morality and the historical drama. It is written in Alexandrine rhymes, occasionally dropping into heroics in the comedy passages. The melodramatic treatment of its subject is probably referred to by Shakespeare in his now proverbial expression of "speaking in King Cambyses's vein."

CAM'DEN. A town and county-seat of Wilcox County, Ala., 62 miles west by south of Montgomery, on the Louisville and Nashville Railroad. It is in the fertile 'Black Belt' of Alabama. Population, in 1890, 545; in 1900, 478.

CAMDEN. A city and county-seat of Ouachita County, Ark., 115 miles south by west of Little Rock, on the Ouachita River, and on the Saint Louis Southwestern and the Saint Louis, Iron Mountain and Southern railroads (Map: Arkansas, C 4). It has a considerable river trade, shipping cotton, lumber, poultry, and live stock, and contains machine-shops, cotton-compress, cottonseed-oil mill, lumber-mills, and wagon-works. Population, in 1890, 2571; in 1900, 2840.

CAMDEN. A city, port of entry, and county-seat of Camden County, N. J., on the Delaware River, opposite Philadelphia, with which it is connected by several lines of steam ferries (Map: New Jersey, B 4). It is an important railroad centre, the terminus of the Atlantic City and the West Jersey and Seashore railroads, and of divisions of the Pennsylvania Railroad. The city, which occupies an area of about 8 square miles on level ground, has regular streets, one-third of the total street mileage (180 miles) being paved, and, among the more notable features, contains a city hall and county buildings, a hospital, the West Jersey Orphanage, and several other benevolent institutions, good public schools, including an institution for manual training. Camden is an important shipping point; it has large market gardens in the suburban districts adjacent, and is noted for its manufacturing and shipbuilding interests. The leading manufactures are machinery, foundry products, cotton and woolen goods, oilcloth, lumber, chemicals, paints, steel pens, boots and shoes, etc. The government is vested in a mayor, and a unicameral city council, with the customary staff of administrative officials. Camden spends annually in maintenance and operation about $735,000; the main items of expenditure being $180,000 for schools, $125,000 for interest on debt, $100,000 for the police department, $75,000 for the fire department, $70,000 for municipal lighting, and $70,000 for the water-works. The assessed valuation of property, real and personal, is about $29,000,000, and the bonded debt $2,500,000. The sewerage system comprises about 100 miles of mains, and the water-works, including two plants built by the city in 1870 and 1889, at a total cost of $2,500,000, are under municipal operation, the system having 95 miles of mains. Population, in 1890, 58,313; in 1900, 75,935, including 10,100 persons of foreign birth and 5600 of negro descent. Camden, with a population of 1142, was chartered as a city in 1828; the Camden and Amboy Railroad, incorporated in 1833, gave the city its early importance as a railroad terminus. It was the home of Walt Whitman from 1873 until his death in 1892. Consult Fisler, *A Local History of Camden* (Camden, 1858).

CAMDEN. A town and county-seat of Kershaw County, S. C., 32 miles northeast of Columbia, on the Wateree River, which is navigable, and at the intersection of the Southern Railroad and Seaboard Air Line systems (Map: South Carolina, D 2). It is known as a winter resort, and has manufactures of cotton cloths and yarns, lumber-mills, and an extensive brick-making plant. Camden was settled in 1750 by a colony of Quakers from Ireland, and in 1791 was incorporated as a town. It is governed under a charter of 1890, which provides for a mayor, elected every two years, and a municipal council. Here, on August 16, 1780, an English force of 2000 under Lord Cornwallis defeated an American force of 3000 under General Gates, Baron DeKalb being mortally wounded in the engagement; and near here, at Hobkirk's Hill (see HOBKIRK'S HILL, BATTLE OF), an English force under General Rawdon repulsed an American force under General Greene on April 25, 1781. In 1825 a monument was erected to the memory of DeKalb, Lafayette laying the cornerstone. On February 25, 1865, General Sherman entered Camden and destroyed 2000 bales of cotton, a large quantity of tobacco, and a number of buildings. Population, in 1890, 3533; in 1900, 2441.

CAMDEN, CHARLES PRATT, first Earl of (1714-94). An English Chief Justice and Lord Chancellor, third son of Sir John Pratt, a Chief Justice under George I. He was born at Kensington and educated at Eton and Cambridge. In 1734 he became a fellow of his college, the next year obtained his B.A. degree, and in 1740 that of M.A. He studied law and was admitted to the bar in 1738. His prospects were discouraging until 1752, when he successfully defended a bookseller for libel on the House of Commons. In 1757 he was appointed Attorney-General, and in 1762 Chief Justice of the Common Pleas. He presided over the trial of Wilkes (q.v.) and declared the action of Government illegal, an opinion which, according with public sentiment, made him the most popular of judges. In 1765 he was created Baron Camden by the Rockingham administration, whose American policy and treatment of Wilkes, notwithstanding, he constantly opposed. The following year, although appointed Lord Chancellor, he did not abandon his principles; and four years after supported an amendment made by Chatham on the Government address, and resigned his office. Henceforth he was a political character. He took an active part against the ill-advised American policy pursued by Lord North, and in discussions on the law of libel, was called 'the maintainer of English constitutional liberty.' During the Revolutionary War he was very popular in the United States, and his memory is perpetuated by many counties, towns, and villages named after him. He was president of the council under Rockingham in 1782-83 and under Pitt from 1783 until his death, April 18, 1794. He was created Earl Camden and Viscount Bayham in 1786.

CAMDEN, WILLIAM (1551-1623). An antiquarian and historian, surnamed 'The British Pausanias.' He was born in London, where his father was a house-painter, May 2, 1551. His education began at Christ's Hospital, was completed at Saint Paul's School and at Oxford, where he obtained a B.A. degree in 1573. In 1575 he was appointed second master of Westminster School, and while discharging the duties of this office he undertook the work which made his name famous. His *Britannia*, written in elegant Latin, and giving an account of the British Isles from the earliest ages, was first published in 1586, and it at once brought him into communication with the learned men of his time. Before 1607 the work had passed through six editions, being enlarged and improved by the industry of the author. At first a comparatively small volume, it received much additional matter from other writers. The best-known edition is that of Edmund Gibson, in English, 2 vols., folio (1722). The latest translation is that of Gough and Nichols (2d ed., 1806). Bishop Nicholson said of this work that it was "the common sun whereat our modern writers have all lighted their little torches." In 1593 Camden was appointed head master of Westminster School; and in 1597 Clarencieux King-at-Arms, an appointment which gave him more time for the pursuit of his favorite studies. His other important works are: *Annals of the Reign of Elizabeth* (latest ed., 1717); *A Collection of Ancient English Historians* (6th ed., 1607); *An Account of the Monuments and Inscriptions in Westminster Abbey* (1600); and a *Narrative of the Gunpowder Plot* (1607). He died November 9, 1623, at Chiselhurst, in the house which afterwards belonged to Napoleon III., and was buried in Westminster Abbey. Before his death he endowed a professorship of history at Oxford.

CAMDEN SOCIETY. An English association organized in London in 1838, and named in honor of William Camden. Its object is the publication of historical and literary remains of antiquarian and general interest. The publications began in 1847. After 104 volumes had been issued, a new series began, which up to 1900 includes an additional 63 volumes.

CAMEL (OF., Lat. *camelus*, Gk. *κάμηλος*, *kamēlos*, from Heb. *gāmāl*, camel). A large desert-dwelling ruminant of two species, constituting the typical genus, Camelus, of the family Camelidæ. Both have been subjugated to man since prehistoric times, and neither is known or remembered in a wild state. The free camels which now roam in northern Turkestan, where they are hunted for their flesh, hides, and superior wool, are descendants of the few which survived the vast sand-storms which, about 1700, overwhelmed the villages on the Gobi plateau and killed all the people. The two species of camel are the true or Arabian camel (*Camelus dromedarius*), having one hump, and the Bactrian camel (*Camelus Bactrianus*), with two humps. These humps are stores of flesh and fat, reabsorbed in support of the animal when overtaken by famine, as is so likely to happen.

The former is the common and widespread species, found from northwestern India and the lowlands of Afghanistan down to the extremity of Arabia east of the Red Sea and Somaliland to the south, and westward as far as the African deserts extend. They have also been introduced into Australia, Spain, Zanzibar, and the southwestern United States, but without permanent economic success. The United States Government spent much money and pains to acclimatize them as an army transport service in the dry southwestern regions, about 1857; the Civil War interrupted the arrangements, but the attempts made by private hands to utilize the animals were not profitable. Many were turned loose and remained wild along the Mexican border, but multiplied very little, and they are now supposed to be extinct. The British Government has made extensive use of them in its military operations in India and Upper Egypt, both as baggage animals, and in hauling artillery, and as mounts for a division of 'cavalry' known as the 'camel corps.' Consult Gleichen, *With the Camel Corps Up the Nile*, London, 1888, wherein many interesting facts as to the habits and qualifications of the animal are given.

What country was the original home of this species is uncertain; it seems more thoroughly adapted to a sandy region than the Bactrian, and is presumed to have had a more southerly habitat than the latter, probably inhabiting Arabia and perhaps the Sahara when first enslaved by primitive men. It is singularly adapted to subsistence in the desert by the structural qualities elsewhere mentioned (see CAMELIDÆ), and by its ability to bite off and consume the tough shrubbery and even thorny plants which alone grow there, and to endure the burning heat and flying sand. To this end it has acquired not only the thick and broad sole-pads, but the thick callosities on the joints of the legs and on the chest upon which it rests (in a kneeling posture) when it lies down; moreover, the nostrils may be closed against the flying dust, and the eyes are shaded and shielded by very long eyelashes. Its extremely acute sense of smell, especially for water, is another life-saving provision. All these qualities have combined to render it so highly serviceable to man in the great wastes that separate the habitable regions south and east of the Mediterranean, Black, and Caspian seas, that it is safe to say these could never have been colonized and have been the scenes of the momentous incidents and impulses they have contributed to civilization had it not been for the assistance of this ungainly and unlovely creature. "I can speak from experience," remarks Captain Wellby (*'Twixt Sirdar and Menelik*, New York, 1901), "of this marvelous endurance of camels, for on a previous trip in Somaliland I once marched with a string of camels for eleven days, during which time none of them had a drop [of water]."

The Bactrian camel is better adapted, by its smaller size and heavier build, harder and more cloven feet, longer and finer wool, and other qualities, to a rocky and cooler region, and its home is central Asia, from northern Turkestan to Mongolia. Its endurance is equally remarkable, under different circumstances, with that of its southern congener, for it withstands the awful climate of the Tibetan plateau, where the temperature rises to 140° F. in summer and sinks to Arctic cold in winter; it tramps with burdens of tea or hauling wagons or sledges over the plains, and often through wintry snows, from Peking to Lake Baikal, and carries heavy loads over the lofty passes of the Hindu Kush, and across the flinty plains of Afghanistan, and thence to Persia. It is this ability to endure climatic extremes, variety of fare, and famine, which has perpetuated the camel through a longer generic history than that of almost any other animal, and has made it of so much service to mankind in regions unendurable by most cattle or horses.

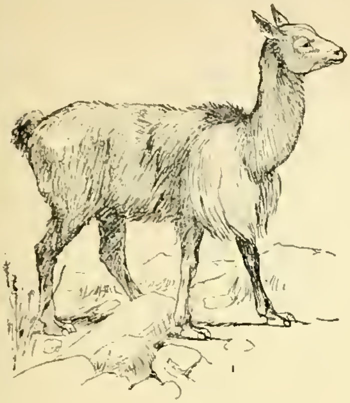
The Arabian camel carries twice the load of a mule. The Bactrian camel is sometimes loaded with 1000 or even 1500 pounds weight, although not generally with so much. A caravan sometimes contains 1000, sometimes even 4000 or 5000 camels. The supply of food carried with the caravan for the use of the camels is very scanty; a few beans, dates, carob-pods, or the like, are all that they receive after a long day's march, when there is no herbage on which they may browse. The pace of the loaded camel is steady and uniform, but slow—about $2\frac{1}{2}$ miles per hour. Some of the slight dromedaries, however, can carry a rider more than 100 miles in a day. The motion of the camel is peculiar, jolting the rider in a manner extremely disagreeable to those who are unaccustomed to it; both the feet on the same side being successively raised, so that one side is thrown forward, and then the other.

The patience of the camel has been celebrated by some authors, but this is mainly indifference and stupidity. It submits because it knows no better, cares nothing for its master, is influenced to a very slight degree by either kindness or harshness, is unhappy when alone, and always untrustworthy; is cowardly, and, at the rutting season, is subject to sudden and violent fits of rage, when it uses its teeth with terrible effect.

The camel produces only one young one at a time, or rarely two. It lives thirty or forty years. During the long ages it has been subjected (the word 'domesticated' hardly applies) to man, almost as many breeds have been created as in the case of the rose, and there is a vast difference between those bred as baggage animals and those reared for the saddle; the latter, light and swift, often capable of traversing 100 miles of desert a day, are 'dromedaries,' whether one-humped or two-humped.

The great value of the camel to the desert people is due to its manifold usefulness, for besides its utility as a carrier of both man and his burden, and as a means of trade, its flesh is good food, and the milk is excellent; from the hair, cloth, ropes, etc., are made; the hide is serviceable; the bones (in eastern Asia) serve as ivory; and the dung is in some regions almost the sole dependence of the nomads for fuel. The animal is nevertheless steadily decreasing in im-

CAMELS AND LLAMAS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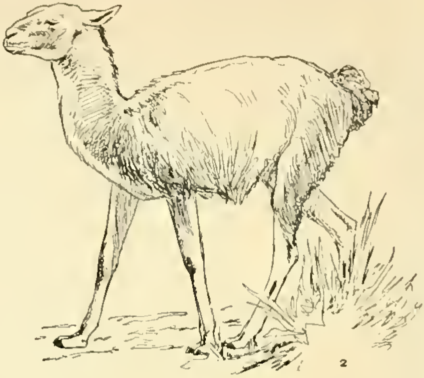
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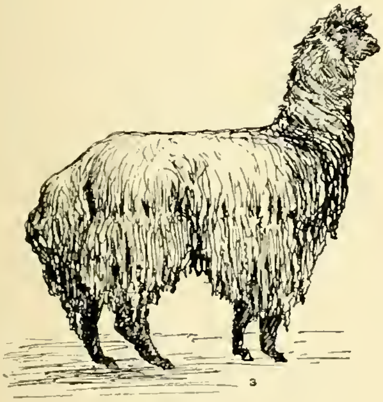
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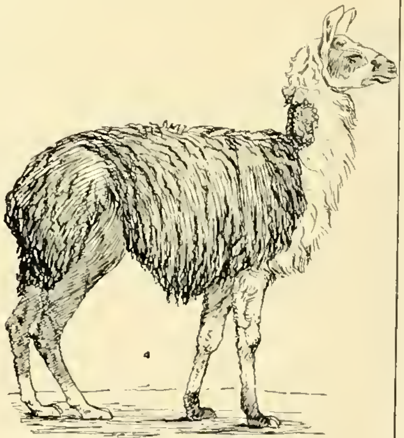
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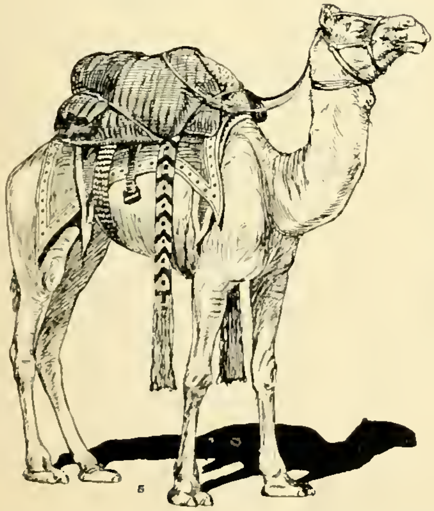
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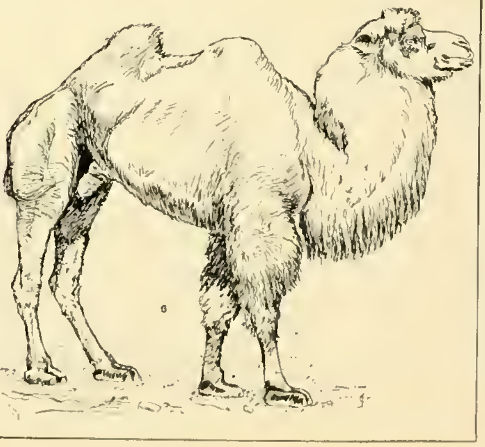
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1. VICUNA (Lama vicuna).
2. GUANACO (Lama guanacus).
3. ALPACA (Lama pacos).

4. LLAMA (Lama glama).
5 ARABIAN CAMEL, Dromedary type.
6. BACTRIAN OR TWO-HUMPED CAMEL.

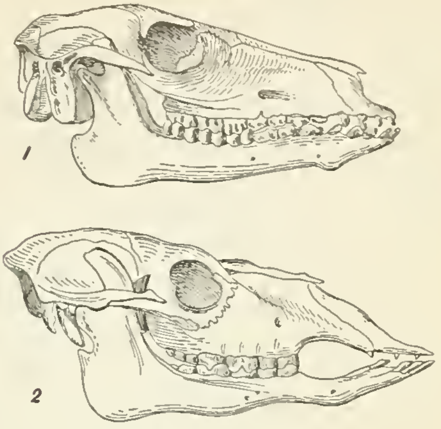
portance by the advance of railways, the opening of wagon roads, and other supersessions of its service, even in the remoter parts of its arid domain. See Plate of CAMELS AND LLAMAS.

CAMEL (from *camel*, as carrying heavy burdens). A water-tight, box-like contrivance designed for lifting ships, sunken weights, etc. The use of wooden floats for lightening the draught of a ship to permit her to pass over a shoal or bar is very old, but the invention of hollow floats, or camels, is ascribed to the Dutch, and their first use is said to have been about 1688. The ordinary camel is a simple rectangular box float, and is much used in navy-yards and private shipbuilding establishments. The camels designed by the Dutch were sometimes a hundred feet or more in length, 20 feet broad, and made to fit the sides of the ship; they were allowed to fill with water, hauled up close to the vessel's sides, and secured in place by chains and lashings. When the ship reached the shoal or bar the water was pumped out of the camels, and the increased buoyancy thus obtained raised the ship enough to materially decrease her draught. Modern camels which are used in wreck-raising are generally built of steel and fitted with machinery for working the chains which support the wreck or attach it to the camel.

CAMEL-BIRD. The ostrich; a book-name.

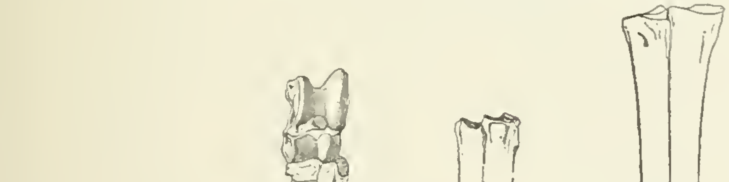
CAMEL CRICKET, or CAMEL LOCUST. A mantis (q.v.).

CAMEL'IDÆ (Neo-Lat., from Gk. κάμηλος, *kamēlos*, camel). The camel family, constituting a section of the ruminants termed Tylopoda, in reference to the character of the feet. This family is composed of two genera—*Camelus*, with two species (see CAMEL), and *Llama*, the American llamas, considered by some naturalists one species, by others four. (See LLAMA.) These animals agree in peculiarities of structure, which separate them from other ruminants, mainly as follows: Though a full set of incisor teeth are present in the young, only the outermost continue through life as isolated laniariform teeth: canines are present in both jaws, and the molars are solenodont in type. The skeleton has many peculiarities, of which a striking one is the excessive comparative length of the thigh-bone, and the detachment of the hind leg from the body. The limbs are long, the ankle-bones peculiar, and all traces of phalanges are lost, except the third and fourth. These are not incased in matched hoofs, like other artiodactyls, but the foot consists of two elongated toes, each tipped with a small, nail-like hoof, the feet resting not upon the hoofs, but upon elastic pads or cushions under the toes. In the camels the toes are united by a common sole, thus resting upon one extended pad, instead of having each a separate one, as in the llama group, the broader expanse of the foot enabling the animals of the one genus more easily to traverse the loose sand of the desert, while the narrow



SKULLS OF CAMELS.

1. Poëbrotherium, an extinct primitive type. 2. Existing camel, showing change in dentition.



FEET OF FOSSIL CAMELS.

Bones of the feet, showing progressive development toward increase of size, union of metapodials, etc.: 1. Protylopus (Eocene); 2. Poëbrotherium (Oligocene); 3. Gomphotherium Sternbergi (John Day Beds); 4. Gomphotherium cameloides (Loup Fork Beds); 5. Procamelus (Loup Fork Beds). (After Wortman.)

form and separation of the toes in the other is suited to the uneven surface of rocky heights. The head is long, without any horns or antlers, the lips extended and mobile, the neck of unusual length; the blood-corpuscles are oval instead of circular, as in all other mammals, and the digestive organs are characterized by a remarkable peculiarity in the structure of the stomach. "Though these animals ruminate," to quote Flower and Lydekker, "the . . . interior of the rumen or paunch (see Ruminant) has no villi on its surface, and there is no distinct psalterium or manyplies. Both the first and second compartments are remarkable for the presence of a number of pouches or cells in their walls, with muscular septa, and a sphincter-like arrangement of their orifices, by which they can be shut off from the rest of the cavity, and into which the fluid portion only of the contents of the stomach is allowed to enter." Such is the celebrated arrangement by which the camel stores in its stomach more water than it can immediately use, and by gradually using it is able to make far longer journeys across arid regions than otherwise would be possible. This has customarily been regarded as a very striking special provision for the needs of the camel of the desert; but it is equally characteristic of the llamas, which inhabit well-watered regions, and has evidently descended to both from a remote common ancestry, regardless of present environments. See Alimentary System.

The structural evolution of the camel recalls that of the horse. (See Equidæ.) In the oldest Tertiary rocks of the ancient lake region of the Rocky Mountains, at the dawn of the Eocene, have been found diminutive remains suggesting this type, and in the Upper Eocene fossil skeletons undoubtedly cameloid. These belong to an animal (Prototylops) hardly larger than a jackrabbit, yet camel-like in many particulars. It had four distinct toes, of which the third and fourth were most useful, while the lateral second and fifth were smaller; the metapodial bones were disconnected, and there was no space between the bunodont molars and the front teeth, where the canines and incisors were alike. By changes that went on analogous to those in other ungulates, there is found in subsequent cameloid forms increase in size, and a constant tendency toward acquiring the dentition and pedal anatomy characterizing modern forms. The next advanced form is greater in size, and the lateral toes, no longer useful, hang to the side of the foot above the ground like a deer's. A steady increase of size goes through the ascending formations of the Miocene, until we reach Procamelus, at the top of the Miocene (Loup Fork beds of Wyoming), which was as big as a sheep and very llama-like, with teeth nearly of modern type and the metapodial bones firmly united when fully adult. During the Miocene the western American plateau seems to have been an arid desert, and under such conditions were developed the large, splayed feet, bereft of the useless side toes, the great sole-pads, and the pouched stomach that characterize the race. At the close of the Miocene, however, there came about a steady change toward a warmer, moister climate, inducing forest growth, which put an end to camel life in North America. Meanwhile they had migrated into South America, where fossil remains of great size are found, and where the family still survives, in the modified and perhaps degenerate forms of the llamas; and also northwestward to Siberia, and thence into Central Asia, where their remains are found in the Pliocene rocks of India, but not earlier. Here the conditions were favorable, and the modern camels seem to have developed. It thus appears that North America was the original home of the Camelidæ, and that they "were derived from pig-like animals quite independently of the true ruminants." For particulars as to American fossil camels, consult Wortman, *Bulletin American Museum Natural History*, X. (New York, 1898).

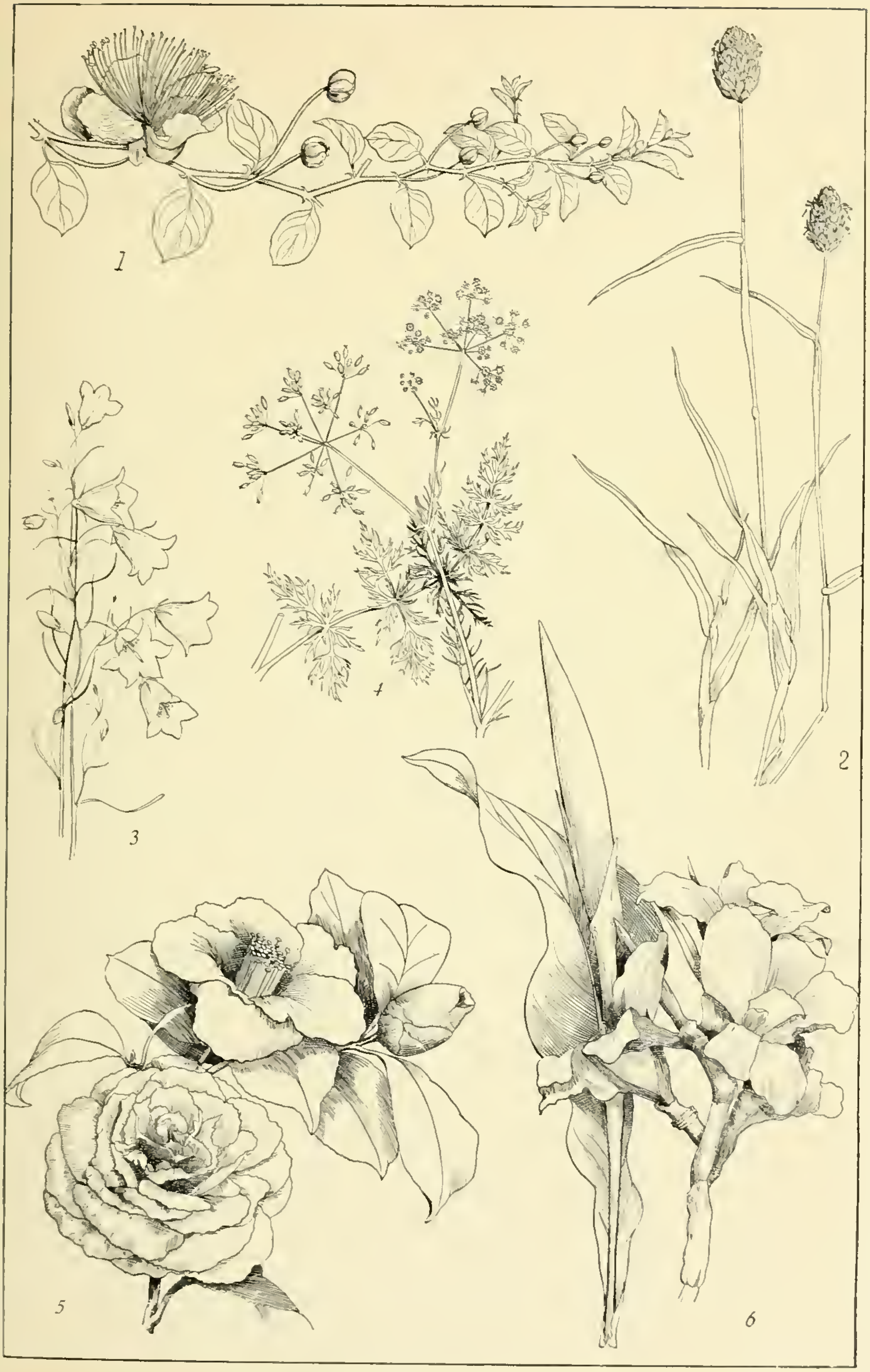
CAM'ELI'NA (Neo-Lat., probably from Gk. χαμαί, *chamai*, on the ground + λίνον, *linon*, flax). A genus of cruciferous plants embracing about a dozen species, most of which are European. *Camelina sativa* is cultivated in Europe and Asia for the oil contained in the seed. The stalks contain a kind of fibre, which is sometimes used for making brooms. The plant has become introduced into the United States, where it is known as false flax, or gold of pleasure, and is considered a bad weed. See Gold of Pleasure.

CAMEL'LIA (Neo-Lat., named after Joseph Kamel, a Moravian traveler of the Seventeenth Century, who first described the *Camellia japonica*). A genus of plants of the natural order Ternstrœmiaceæ, nearly hardy evergreen shrubs or trees, and natives of China, Japan, and the north of India. Camellias are now extensively cultivated as greenhouse shrubs in Europe and in the United States. Many varieties are in cultivation. The best known and most esteemed is *Camellia japonica*, a greenhouse shrub. Its leaves are ovate-elliptical, almost acuminate and serrate shining; the flowers are without stalks, mostly solitary, large, and rose-like. It is a native of Japan, and there and in China it has been carefully cultivated from time immemorial. In its wild state it has red flowers, and the red single camellia is much used by gardeners as a stock on which to graft the fine varieties, the flowers of which are generally double. The colors of the cultivated forms are various, including red, white, and yellow, and the varieties also differ much in the form and position of the petals. The flowering time is in autumn, winter, and spring. Camellias grow best in cool houses. Free access of air is of great importance, and water must be given very liberally, yet with such caution that the soil may never remain soaked after the immediate wants of the plant are supplied. The proper soil for camellias is a loose black mold; a little sand and peat are often advantageously mixed with loam to form it. Camellias are often propagated by cuttings, or layers, but generally by grafting or inarching. The single camellia is also propagated by seed, and in this way the best stocks for grafting are procured. Of the other species of camellia, the most hardy, and one of the most beautiful, is *Camellia reticulata*. The seeds of certain varieties, as *Camellia oleifera* and *drupifera*, are used in China for the production of an olive-like oil. The true tea-plant is a close ally of the camellia. See Tea.

CAMEL'OPARD. See Giraffe.

CAMEL'OPAR'DALIS (Gk. καμηλοπάρδαλις, *kamēlopardalis*, giraffe, literally camel-pard, from

CAMELLIA, ETC.



1. CAPER PLANT (Capparis spinosa), showing edible buds.
2. CANARY SEED GRASS (Phalaris Canariensis).
3. BLUEBELLS (Campanula rotundifolia).
4. CARAWAY SEED (Carum caria).
5. CAMELLIAS (Camellia Japonica), single and double.
6. CANNAS OR INDIAN SHOT (Canna Indica var.).

κάμηλος, *kamēlos*, camel + πάρδαλις, *pardalis*, pard). A constellation defined by Hevelius, between the pole-star, Auriga, Cassiopeia, and the head of Ursa Major, which consists of stars of moderate magnitudes, forming, in imagination, the shape of a giraffe.

CAM′ELOT, or **CALBURY**, kạl′bẽr-ĭ. A steep hill in the parish of Queen's Camel, Somersetshire, England, 5 miles from Ilchester (Map: England, D 5), identified by tradition with Camelot, one of the capitals of the legendary King Arthur (q.v.). Others state that Camelot was the name given in the mediæval romances to the city which grew up out of the permanent quarters of the second Augustan legion at Caerleon-upon-Usk.

CAMELOT. The legendary site of King Arthur's castle and court. It has been variously located in Somersetshire, at or near Winchester, Hampshire, and in Wales. Shakespeare favored the first, Tennyson and Capell the second, and Caxton the third site. The monks of Glastonbury were chiefly responsible for the 'Somerset' theory, which they maintained, especially in the Fourteenth Century, for the purpose of attracting pilgrims and thus enriching their abbey. It is often mentioned in English literature, notably in *King Lear* and *The Lady of Shalott.*

CAMEL'S HAIR. A fabric woven from the hair or wool of the camel, by Persians and Arabs, for tents and clothing. In early ages rough garments of this stuff were worn by monks and priests by way of penance. It is now imported into Europe and used extensively in the manufacture of dress materials, whose chief characteristic is a rough and hairy surface. Cow's hair is sometimes used as a substitute in the cheaper grades of so-called camel's-hair goods. A fine grade of camel's hair is used for artists' brushes.

CAMEN, kä′men, or **KAMEN.** A town in the Province of Westphalia, Germany, on the Seeseke, 10 miles southwest of Hamm. It is a thriving industrial centre, with coal-mines, paper-mills, and iron-foundries. Population, in 1900, 9888.

CAME′NÆ (Lat., Old Lat. *casmenæ*, muses, prophetesses, connected with *carmen*, song). In Roman mythology, nymphs possessing the power of prophecy, as Carmenta and Egeria. They had a sacred grove in Rome, just outside the Porta Capena. (See EGERIA.) The Roman poets often apply the name *Camenæ* to the nine Muses of Grecian myth.

CAMENZ, kä′mĕnts. See KAMENZ.

CAMEO (It. *cammeo*, Fr. *camée*, Med. Lat. *cammæus*). Gems cut in relief are called cameos, in opposition to those that are hollowed out so as to yield a raised impression, which are called *intaglios.* The term cameo, however, is applied more especially to those diminutive pieces of sculpture which are prepared from precious stones having two strata or layers of different colors, the undermost of which is left to form the background, the object to be represented being cut in the upper one. The stone generally used for this purpose by the ancients was the variegated sardonyx.

True cameos were probably not made before the Third Century B.C., though in very early times we find the backs of seals decorated with figures in relief, so especially in the *scarabæi*, seals decorated on the back with the sacred beetle of Egypt. As precious stones were used in the Orient and among the Greeks after the conquests of Alexander for many decorative purposes, the Greek artistic sense sought to raise this decoration to a higher plane, and this seems to have led to the carving of the gems into reliefs. At this period cameos were very extensively used, not only as personal ornaments, but in cups, vases, candelabra, and other objects of domestic luxury. Pateræ and other vessels were frequently worked out of a single stone, upon which were exhibited a whole series of figures of the most exquisite workmanship. Many of the antique cameos which have been preserved are wonderfully beautiful, both in design and execution. Of the Alexandrian cameos, probably the finest is the "Tazza Farnese," a shallow dish cut from a single sardonyx, and now in Naples. Other very fine specimens of the early period are the Gonzaga cameo in Saint Petersburg and a companion in Vienna, containing the portraits in profile of a man and a woman. They are commonly said to be portraits of Ptolemy II. and his Queen, Arsinoë, but are quite as probably Alexander the Great and Olympias (so Furtwängler). Of cameos of the Roman time, many fine specimens are to be found in the Continental museums. Especially noteworthy are the Gemma Augustea in Vienna, and the large sardonyx in Paris; both show Roman emperors, Augustus and Tiberius, triumphing over barbarians. Very celebrated is the "Cupid and Psyche" formerly in the Marlborough collection, now in the Boston Museum of Fine Arts, by Tryphon, who is supposed to have lived in the time of Augustus. The stones on which many of these cameos are cut are of surprising, and, in modern times, unequaled size and perfection. Cameos do not seem to have been made in mediæval times; but the art revived in Italy, under the auspices of the Medici, and the production of cameos, both in *pietra dura* and in shell, has there become a branch of art manufacture of considerable importance. Impressions from antique cameos in glass, sulphur, porcelain, and other materials are produced in many places, and, for artistic purposes, possess all the value of the originals.

The manufacture of cameos from artificial substances was not unknown to the ancients. One of the most beautiful specimens of an imitation of cameo in glass is the famous Barberini or Portland vase, now in the British Museum. The ground is blue, the figures, which are in low relief, being of a delicate, half-transparent white. (See PORTLAND VASE.) Another example is a beautiful vase, similar in color, in the Naples Museum, the figures of which represent a Bacchanalian sacrifice. Many fragments of the same kind of manufacture exist in other cabinets, and from it the modern Wedgwood ware (q.v.) was imitated.

A shell cameo is a cutting in relief on a precious stone or a shell. It is opposed in meaning to intaglio, which signifies a cutting into the stone or shell. In intaglio work, furthermore, only gems of a uniform color are used, while in cameo engraving or cutting it is desirable to choose such stones or shells as possess layers of varying colors, such as onyx, agate, or tropical sea-shells. These differing tints are skillfully utilized by intelligent engravers, so that at different depths of the cutting very beautiful and effective gradations of color are obtained. Shell, perhaps, gives the most delicate results, owing to the nearness of the color to that of flesh, and the general use made of the human figure and head as subjects for cameo engraving. The art is one of great antiquity, and the engraving of precious stones and of shells in distinct bands of color has been practiced since about B.C. 150. Probably stone and shell, more or less engraved as ornament, talisman, and seal, are of still more remote times.

Inasmuch as Egypt was the birthplace, as it were, of belief in amulets, charms, and phylacteries of all kinds, it naturally came to pass that it was the earliest country to develop and to encourage the production of these emblems which, for the individual, possessed a magical and religious significance. From the time of the dynasties of the first Pharaohs to the period of the domination of the Romans, the inhabitants of the valley of the Nile, men and women, all wore about the neck, on the finger, or hung somewhere on their garments, cut or engraved gems of a talismanic character, which also served, in some sort, as a personal seal. It is safe to say that no country of ancient times has produced in such profusion precious stones in relief and in intaglio. It was in the Greek and Roman period that the cameo reached its perfection. The century of Scopas, Praxiteles, Lysippus, and Apelles produced an artist in gems whom all antiquity praises, but from whom there has not come down to us a single signed work. This artist is Pyrgoteles. Pliny and many others speak of him as the ablest engraver of all time, and place him in the same rank as the abovementioned sculptors and painters. Pyrgoteles probably engraved several portraits of Alexander in cameo and intaglio, though none can be authenticated. Although cameo is sculpture in miniature, we see by this that it engaged the talents of really great artists. Among the largest examples of ancient cameo work is the Sainte Chapelle agate in Paris (13 x 11 inches), representing the apotheosis of Augustus, and the Vienna onyx, an allegorical representation of the coronation of Augustus. These surpass, in size and beauty of execution, the best of modern productions in this art.

BIBLIOGRAPHY. Agostini, *Gemmæ et Sculpturæ Antiquæ Depictæ ab L. Augustino* (Paris, 1685); Zanetti, *Le gemme antiche* (Venice, 1750); Marsh, *Cameo Cutting* (London, 1891); Thompson, "On the Working of Shell Cameos," in *Art Journal* (ib. 1898); Davenport, *Cameos* (ib. 1900); and especially Furtwängler, *Die Antiken Gemmen* (Leipzig and Berlin, 1900).

CAMERA LU'CIDA (Lat., light chamber). A device fitted to the eyepiece of a compound microscope to enable the observer to trace upon a sheet of paper the magnified image of the object as seen. It is constructed in various forms, the simplest of which is a small plate of glass attached to the eyepiece at an angle of 45 degrees, as shown in Fig. 1. A portion of a slide or cover glass fixed to the eyepiece with wax can be employed for this purpose. In using the camera lucida, the tube of the microscope is placed in a nearly horizontal position, and a sheet of paper laid on the table beneath the eyepiece. The rays coming through the eyepiece are reflected into the eye from the glass, though coming apparently from the paper below, where an enlarged image of the object is seen. The outline of the image can readily be traced with a pencil, and in this way an accurate representation of the object can be quickly made. Instead of the simple mirror of glass, Sömmering employed a flat, circular piece of polished steel or speculum metal, whose diameter was somewhat smaller than that of the pupil of the eye. The rays are reflected vertically, and enter the eye, as do also those from the paper which come to the eye, after passing by the edges of the mirror. A prism, so constructed that total reflection occurs one or more times, is often employed, and the arrangement of Wollaston, which is frequently used, is illustrated in the figures and described below. It consists of a small quadrilateral prism of glass, which Fig. 2 shows in perpendicular section, held in a brass frame, which is fitted in front of the eyepiece by a suitable mounting, or attached to an upright rod, having at its lower end a screw-clamp, to fix it to the edge of a table. The prism, being at the height of about a foot from the table, has its upper face horizontal. Two of its faces, as in

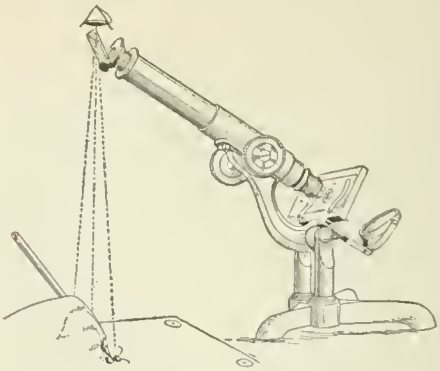


FIG. 1. SIMPLE CAMERA LUCIDA.

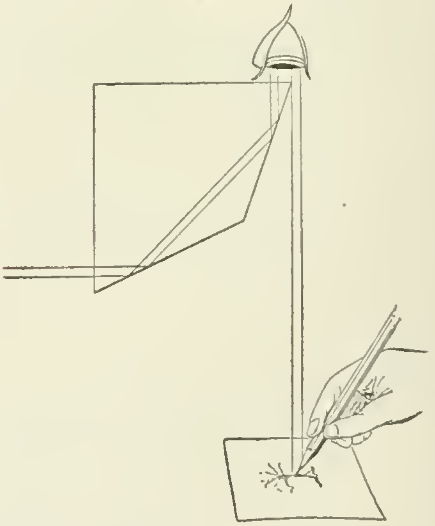


FIG. 2. WOLLASTON'S CAMERA LUCIDA.

the figure, are at right angles: the contiguous faces make respectively with them angles of 67½°, so that the remaining obtuse angle contains 135°. Rays coming from an object and falling nearly perpendicularly on the first surface enter the prism, and undergo total reflection at the contiguous surface; they then fall at the same angle on the next surface, and are totally reflected again; finally, they emerge nearly perpendicular to the remaining surface. An eye, as in the figure, then receives the emergent pencil through one part of the pupil, so that an image of the object is seen projected upon a sheet of paper upon the table. The rays from the paper and pencil passing the edge of the prism enter the other part of the pupil; and the pencil and image being seen together upon the paper, a sketch of the latter can be made. There is, however, a practical difficulty—the image and the drawing-pencil are at distances sensibly different from the eye, and so cannot be seen together distinctly at the same time. To obviate this, a plate of metal, with a small aperture, as an eye-hole, is placed at the edge under the eye, so that the rays through the prism, and those from the drawing-pencil, which both pass through the eye-hole, form only very small pencils. A convex lens is also sometimes employed for this purpose. The form of camera lucida devised by Abbe is also used with the microscope. It consists of two right-angle prisms with their hypothenusal faces placed together and a reflecting mirror, as shown in Fig. 3. The separating surface, *ad*, is formed by a thin film of silver, except a circular space at *bc*, through which the direct rays from the microscope pass, as indicated by the arrow OM. To an eye placed at O, the rays from the paper are reflected by the mirror *Sp*, and again at the silver film between the prisms, so that the image of the magnified object appears on the paper. This arrangement is so mounted that it can readily be moved to and from the eyepiece. By using a finely divided glass scale as an object, we may obtain projected on the paper a magnified image of the divisions, so that the width of the intervening spaces can be measured. A ratio between the scale division, unmagnified and as they appear on the paper at a distance of 10 inches from the eye, will give the magnifying power of the microscope. Consult Carpenter, *The Microscope and its Revelations*, 8th ed., edited by Dallinger (Philadelphia, 1901).

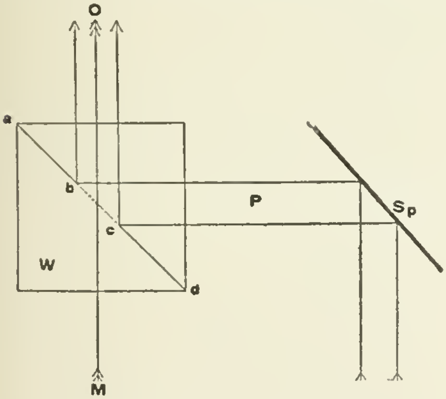


FIG. 3. ABBE'S CAMERA LUCIDA.

CAMERA OBSCU'RA (Lat., dark chamber). A light-tight box, with a convex lens at one end and a screen at the other, on which an image is produced. This screen is generally a piece of ground glass, or translucent paper, so that the image may be viewed from behind. The rays of light coming from an object pass through the lens, and when they reach the screen form an image which can be received on a sensitive plate and preserved in the form of a negative. If the screen is placed at the appropriate focal distance, a sharp representation of an object can be obtained. The human eye is a simple form of camera obscura, the crystalline lens and retina occupying the relative positions of lens and screen. The lens is not essential for the formation of an image, as with a small opening a picture is also produced. Such an image, while free from distortion, is not apt to be sharp, and a long exposure in making a negative is required.

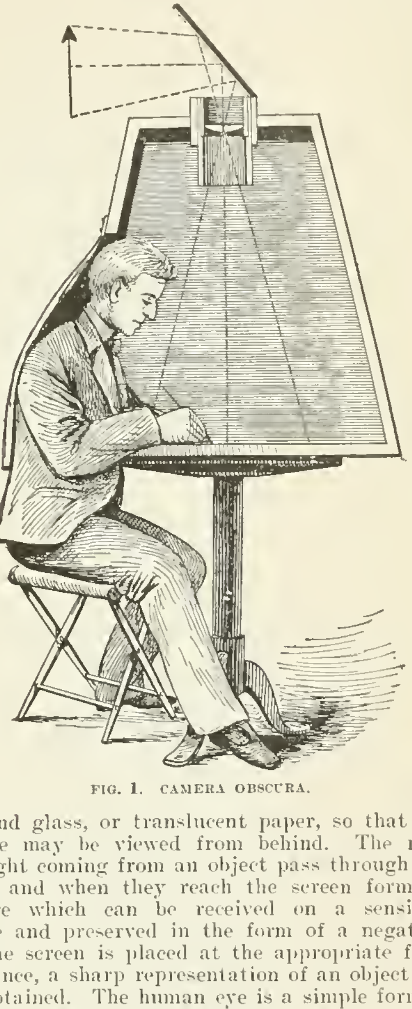


FIG. 1. CAMERA OBSCURA.

The invention of the camera obscura is of importance on account of its being the prototype of the modern photographic camera, and is claimed for a number of celebrated men. The first of these is Roger Bacon, who lived in the Thirteenth Century, and after him comes Alberti, about two centuries later. Leonardo da Vinci, the famous painter and scientist, about the beginning of the Sixteenth Century, says that if you place yourself in an hermetically closed room, facing a building, landscape, or any other object directly lighted by the sun, and then cut a small circular hole in the shutter, images of the objects outside will be thrown on any surface facing the hole, and will be reversed. Such was the condition of the camera until the time of Cardan, about the middle of the Sixteenth Century, when he improved it by the addition of a convex lens at the aperture. The instrument in this form is described in his work *De Subtilitate*. In 1569 Giambattista della Porta, of Naples, to whom the invention is generally ascribed, in the seventh book of his work on Natural Magic, gives a detailed description of the apparatus, and in his instrument he placed an inclined mirror before the lens, with the result that the pictures were rendered brighter and erect, instead of inverted. Porta's camera obscura attracted general attention, and the instrument was soon provided for the country houses of the wealthy, being placed usually in a small conical building, with a white table or surface in the centre, on which the pictures were projected. A more modern form is shown in Fig. 1.

The camera obscura in the form of a box, with inclined mirror and a piece of ground glass or paper on which the images could be traced, was invented by Hooke in 1679. This instrument has since become familiar in the form of an optical toy, shown in diagram in Fig. 2, though the same principle has been made use of in certain pieces of scientific apparatus. The camera obscura in its simple form of lens and screen, suitably incased, was first used for photographic work by Humphry Davy in 1802, at a time when he was engaged in experiments with Wedgwood. After this, the camera obscura was used by all the early experimenters in photography (q.v.), and the instrument has since been developed and amplified to a remarkable degree. The photographic camera is constructed in an almost infinite variety of styles, depending in the main on the purpose for which it is to be used. In general, it consists of two boxes, joined by a flexible and light-proof material, such as a bellows of leather, rubber, or cloth, and susceptible of being moved toward or from each other, so that the distance between the lens and focal plane or position where the image is received can be varied. In one of these boxes, or on an upright board taking its place, the lens is mounted, and on the other there is a frame carrying a piece of ground glass, which, at the time of taking the picture, is removed and the sensitive plate or film substituted. This is contained in a holder so constructed that the sensitive surface occupies the same position as the original focusing glass.

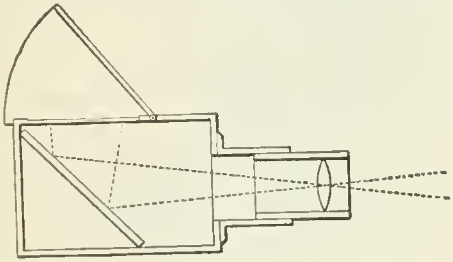


FIG. 2. CAMERA OBSCURA.

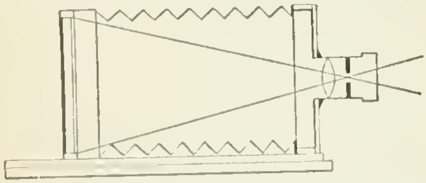


FIG. 3. SIMPLE PHOTOGRAPHIC CAMERA.

The construction of a camera varies with the use or process for which it is intended. Thus, for out-of-door work portability and rapidity of adjustment are essential, whereas in a studio or laboratory rigidity and adaptability are demanded. A view camera does not require any considerable length of bed, or base, as the ground glass is never distant from the lens a much greater amount than the principal focus (q.v.), as the pictures are generally on a reduced scale. If a camera, however, is designed for copying or enlarging, then it must have a long bed, as the distance from the lens to the ground glass will be as many times greater than the distance between the original object and the lens as it is desired to enlarge the picture. Frequently in the case of hand-cameras the ground glass is omitted, and the proper focus is obtained by reference to a graduated scale on the bed, on which are marked the foci corresponding to different distances.

The use of films and increased ease of manipulation has made photography universally popular, and there are almost as many styles of cameras as there are individual tastes. See article PHOTOGRAPHY.

CAM'ERA'RIUS, JOACHIM (1500-74). A distinguished German classicist, born at Bamberg, April 12, 1500, of a family which originally bore the name Liebhard; for this Camerarius (Ger. *Kammermeister*) was substituted, since the office of chamberlain to the Prince-Bishop of Bamberg was hereditary in the family. At the age of thirteen, Camerarius entered the University of Leipzig, where the influence of Georg Held, with whom he was on intimate terms, led him to devote himself to the classics. He eventually was second only to Melanchthon (q.v.) in arousing an interest in classical study in Germany. In 1518 he began to teach Greek at Erfurt, but in 1521 he moved to Wittenberg, where he attached himself to Melanchthon. At the latter's recommendation, he was appointed to teach Greek and history in Nuremberg in 1526. Nine years later he was called to the University of Tübingen as professor of the Greek and Latin literatures. In 1541 he went to Leipzig, where he continued to lecture until his death, April 17, 1574. He contributed to the eminence of this university, not only by his teaching and writing, but also by the practical measures of university reform which he, with certain associates, was able to carry through. He was especially distinguished for his critical judgment, in which he surpassed Melanchthon, while his knowledge of the classics was not inferior to that of his friend, so that he deserves to be regarded as the greatest German classicist of his century. His works were very numerous. Besides biographical and theological writings, the most important are the following editions: *Homeric Poems*, with the so-called scholia of Didymus (Basel, 1541); *Greek Elegiac Poets* (Basel, 1550); *Theocritus*

(Frankfurt, 1545); *Sophocles* (Basel, 1556); *Herodotus* (Basel, 1540 and 1557); *Thucydides*, with the scholia (Basel, 1540 and 1557); *Theophrastus* (Basel, 1541). He was also co-editor of the edition of Galen, published by Cratander (Basel, 1538, et seq.). After Camerarius's death, a number of Greek works and Latin translations were published by his relatives. Among the Latin authors edited by him should be named Quintilian with Commentary; Cicero (Basel, 1540); many separate works between 1542-1558; above all his edition of Plautus (Basel, 1552), for which he employed the so-called *Codex Vetus Camerarii* and the *Codex Decurtatus*, and thus for the first time secured a certain basis for the text. A full list of his works may be found in Pökel, *Philologisches Schriftstellerlexikon* (Leipzig, 1882). Consult Bursian, *Geschichte der klassischen Philologie in Deutschland* (Munich, 1883), pp. 185-90.

CAMERARIUS, Rudolf Jakob (1665-1721). A German botanist and physician, professor of medicine and director of the botanic garden at Tübingen. He was the first to recognize sexual differences in plants (1694).

CAMERINO, kä′mȧ-rē′nȯ (Lat. *Camerinum*). A city in central Italy, with a bishopric dating from 252 and an archbishopric dating from 1787, between the Chienti and the Potenza, about 70 miles southwest of Ancona (Map: Italy, H 4). The cathedral, built in 1832, occupies the site of a temple of Jupiter. The town possesses a university, founded in 1727 (the smallest in Italy), and a library of 40,000 volumes. There are also the archiepiscopal palace, the ducal palace, the new palace, and a bronze statue of Sixtus V., erected in 1587. The chief industry is silk-growing. Population, in 1881, 12,000; in 1901, 12,542.

CAM′ERLEN′GO, or **CAM′ERLIN′GO** (It., chamberlain). The officer, generally a cardinal, who controls the finances and the secular interests of the Pope. During a vacancy in the Holy See, he is sole head in things temporal, and presides over the apostolic chamber or palace. In things spiritual, however, he is assisted by the other cardinals.

CAM′ERON, Archibald (c.1771-1836). An American clergyman, born in Scotland. He studied at Transylvania Seminary (later University), Lexington, Ky., was licensed to preach in 1795, ordained in 1796, and in the latter year was installed over the churches of Akron, Fox Run, and Big Spring. For many years the only Presbyterian clergyman in a wide extent of territory, he was occupied with itinerant labors until 1828, from which time he was pastor of the churches at Shelbyville and Mulberry. With the Rev. David Rice, he was a pioneer in the organization of the Presbyterian Church in Kentucky. Among his publications are: *The Faithful Steward* (1806); *An Appeal to the Scriptures* (1811); *A Defence of the Doctrines of Grace* (1816); and *A Reply to Some Arminian Questions on Divine Predestination* (1822).

CAMERON, Sir Charles (1841—). A Scotch journalist and politician, born in Dublin. He studied at Madras College, Saint Andrews, and Trinity College, Dublin, and at the medical schools of Paris, Berlin, and Vienna, and from 1864 to 1874 edited the *North British Daily Mail*. From 1874 to 1885 he was member of Parliament for Glasgow, from the subdivision of the constituency in 1885 until 1895 sat for the College division, and in 1897 was elected for the Bridgeton division. He introduced into the House the resolutions whose carriage effected the introduction of sixpenny telegrams, the previous minimum charge having been a shilling. He has published monographs on political and other subjects.

CAMERON, Sir Charles Alexander (1830—). An Irish physician and chemist. He was born in Dublin, and was educated in Dublin and Guernsey and in Germany. In 1862 he became public analyst for the city of Dublin, and in 1867 was appointed professor of hygiene and chemistry in the Royal College of Surgeons in Ireland. The following are a few of his valuable publications: *Elements of Agricultural Chemistry* (in collaboration with J. S. W. Johnston, 10th ed. 1897); *A Manual of Hygiene, Public and Private* (1874); *Lectures on the Preservation of Health* (1868); *The Prevention of Contagious Diseases* (1871).

CAMERON, Charles Duncan (? -1870). An English soldier and explorer. He participated in the Kaffir War of 1846-47, and afterwards in the Crimean War, and served with distinction at Kars, and subsequently, on special duty, at Trebizond. In 1860 he was appointed British consul in Abyssinia, but he did not assume the duties of this office until early in 1862. In June of this year he proceeded from his residence at Massowah to Gondar, for the purpose of delivering a letter and presents from Queen Victoria to King Theodore, but he was here thrown into prison by the King in 1864 for alleged interference in Abyssinian politics, and was held for two years, when he was surrendered to Rassam, the agent of the British Government. Soon afterwards he, with Rassam and other persons, was again imprisoned by King Theodore, and the party was released only when a British force advanced to their rescue. Cameron's account of his experiences was published in the *Parliamentary Printed Papers* (1868-69).

CAMERON, Donald (c.1695-1748). A Scottish chief, known as 'The Gentle Lochiel.' He was born at Achnacarrie, Lochiel, Inverness. He supported the Young Pretender, Charles Edward, who landed in Scotland in 1745. When Lochiel suggested awaiting reinforcements from France, Charles taunted him into invasion of England. Lochiel took Edinburgh in September, 1745, distinguished himself at Prestonpans, marched as far south as Derby, returned to Scotland and captured Falkirk. Governed by his strict but just and humane discipline, his command gained honorable repute by their conduct and forbearance. He opposed the plan of the night attack on Cumberland's army at Culloden, where he was severely wounded. After vicissitudes, he escaped to France, where he was afterwards master of horse to 'the Young Chevalier.' He is the hero of Campbell's poem, *Lochiel's Warning*.

CAMERON, Sir Duncan Alexander (1808-88). An English soldier. He entered the army in 1825, became a colonel in 1854, and served with distinction in the Crimean War. He commanded a regiment at the Alma, and the Highland Brigade at Balaklava and at the siege of Sebastopol, where he took a prominent part in the assault upon the outworks. He commanded the troops in New Zealand in 1863, and in the following year was made a knight commander of the Order of the Bath, in recognition of his services against the Maoris. He became lieutenant-general in 1868 and general in 1874, and from 1868 to 1875 was governor of the Royal Military College at Sandhurst.

CAMERON, George Frederick (1854-85). A Canadian poet, born at New Glasgow, Nova Scotia. Educated at Queen's University, Kingston, he passed several years in the United States and then returned to Canada, becoming editor of the Kingston *News*. A master of rhythm and cadence, Cameron was the most intensely lyrical poet Canada has yet produced. His verse was praised by Swinburne, Tennyson, and Matthew Arnold. Consult: *Lyrics on Freedom, Love, and Death*, edited by C. J. Cameron (Boston, 1887); and Stedman, *Victorian Anthology* (New York, 1895).

CAMERON, James Donald (1833—). An American capitalist and politician, known as 'Don' Cameron. He was born in Harrisburg, Pa., the eldest son of Simon Cameron (q.v.); graduated at Princeton in 1862, and became engaged in banking and various industrial enterprises. As president of the Northern Central Railroad, he did great service to the Union cause during the Civil War. In 1876 he was appointed Secretary of War, and in March, 1877, succeeded his father as United States Senator. By successive reëlections he retained his seat until 1897, when he retired from public life. In 1880 he was chairman of the Republican National Committee.

CAMERON, John (1579-1625). A Scotch scholar and divine. He was born in Glasgow and was educated at the university of that city, where, in his twentieth year, he held an appointment as reader in Greek. In 1600 he set out to travel in France, where his ability and erudition secured for him a philosophical professorship in the University of Sedan. He afterwards acted as a Protestant clergyman in Bordeaux, and on the death of Gomarus (1618), was appointed to the divinity chair in the University of Saumur, an appointment he held until 1620, when, returning to Britain, he was appointed principal of the University of Glasgow (1622); but in less than a year he returned to Saumur; thence to Montauban, where he received a divinity professorship (1624). Here his opposition to the party who advocated a civil war made him many enemies, by one of whom he was stabbed in the street (May 13, 1625); and he died from the effects of the wound a few months later. He was considered one of the best scholars of his time; in biblical criticism he was inclined to be perverse; where there was a difficulty, he usually chose the opposite view to that held by other divines, especially Beza. His theological opinions were of a somewhat lax character, his works being said to be the foundation of Amyraut's doctrine of universal grace. So he is called the founder of the moderate Calvinistic school of Saumur. His collected works were published with a memoir by L. Cappel (Geneva, 1642).

CAMERON, Richard (?-1680). A Scotch minister, born in Falkland, Fife. He was founder of the sect of Cameronians, a term popularly applied to but declined by the Reformed Presbyterians. The son of a tradesman, he was an apt pupil at the village school, and while still a youth became schoolmaster and precentor. He espoused the cause of the itinerant field-preachers, and, possessing natural eloquence, was licensed and admitted to their numbers. In 1679 he joined banished friends in Holland, but returned in 1680, and with others strenuously resisted the measures that reinstated the Episcopal Church in Scotland, and proscribed the meetings for public worship of unauthorized religious bodies. He persisted in preaching in the fields and antagonized the Government by an attitude of defiance. In June, 1680, with twenty well-armed companions, he entered the town of Sanquhar, and in the market-place formally renounced allegiance to Charles II., for abuse of power, and declared war against him and his adherents. He retired to the hills between Nithsdale and Ayrshire, and succeeded in evading capture for a month, though a price of 5000 marks was set upon Cameron's head by the Government, and 3000 for the heads of the other leaders. They were surprised by a superior force in Aird's Moss, July 20, 1680, and after a brave fight Cameron was killed. His hands and head were cut off and fixed upon the Netherbow Port, Edinburgh. The followers who escaped were induced by the Edinburgh Convention of 1689 to assist in the revolution, and formed the nucleus of the renowned Cameronian regiment (q.v.) of the British Army. Consult Herkless, *Richard Cameron*, in Famous Scots Series (New York, 1896).

CAMERON, Simon (1799-1889). An American politician. He was born in Donegal, Pa., was a printer and then an editor, and early in life became prominent in State and national politics. In return for his services toward securing the renomination of Andrew Jackson, he obtained the Pennsylvania political patronage and valuable Government contracts, and thus acquired the beginnings of his great fortune. Largely through his efforts James Buchanan was elected to the United States Senate and later became President. In 1845 Mr. Cameron, now very wealthy, was elected by the Democrats to the United States Senate. He had always been a protectionist, and when his term expired (1849) he became a leader of the People's Party and fused it with the new Republican Party, and was again elected to the Senate in 1856. In 1860 he was a prominent candidate for the Presidency in the convention that nominated Lincoln, and in 1861 was by the latter appointed Secretary of War, though his appointment was bitterly opposed by many men of prominence. Soon after becoming a member of the Cabinet, he expressed himself in favor of arming fugitive slaves, a policy which President Lincoln then opposed, and, much evidence being adduced in Congress to prove the corruption of his administration of the department, he was asked, in January, 1862, to resign his portfolio. From then until the following year he served as United States Minister to Russia. He rendered the country a valuable service in opposing the efforts of those who sought to defeat Lincoln's renomination. He was chosen United States Senator in 1866 and again in 1872. In the administration of President

Hayes he strenuously opposed the executive policy of civil-service reform, and in 1877 he resigned his seat in order that his son, James Donald Cameron, might be elected in his place, thereby virtually keeping in the family the almost entire control of the Republican party in Pennsylvania.

CAMERON, VERNEY LOVETT (1844-94). An English explorer. He was born at Weymouth, Dorsetshire, entered the British Navy in 1857, and saw service on the east coast of Africa. In 1873 he was sent by the Royal Geographical Society on a second expedition to relieve Livingstone. In August Lieutenant Cameron met Livingstone's servants bearing their master's body to the coast. Cameron resolved to push on, and was the first European to cross tropical Africa from east to west, reaching the Atlantic in November, 1875. He found some of Livingstone's papers and a map, explored the southern half of Lake Tanganyika, and learned that the Lualaba was really the Upper Congo. On his return he received many honors, including a D.C.L. from Oxford. He was also chosen to membership in more than thirty scientific societies. He was promoted to commander in the navy. He published an account of his travels under the title *Across Africa* (2 vols., 1876, 2d ed., 1885). In 1878-79 he traveled in Asiatic Turkey and on his return published *Our Future Highway* (1880), advocating a railway from Tripoli to India. In 1882, in company with Sir Richard Burton, he visited the African Gold Coast in search of gold.

CAM'ERO'NIANS. Followers of Richard Cameron (q.v.), of Scotland; officially known as Reformed Presbyterians. (See PRESBYTERIANISM.) They are moderate Calvinists, and assert that the will of man is determined only by the practical judgment of the mind; that the cause of men's doing good or evil proceeds from the knowledge that God infuses into them; and that God does not move the will physically, but only morally, by virtue of its dependence on the mind. This peculiar doctrine of grace and free will was adopted by many eminent teachers, who thought Calvin's doctrine too harsh.

CAMERONIANS (from Richard Cameron). A celebrated regiment of Scotch infantry in the British Army. In the British Army list it is described as "The Cameronians (Scottish Rifles)," Territorial District 26; depot or regimental permanent headquarters, Hamilton. N. B. The regiment consists of two battalions, each of about 1000 men of all ranks, and belongs to the oldest division of the British Army. In its origin it dates back to the time when the Covenanters, a religious body embracing a large majority of the Scottish people during the Seventeenth Century, were in arms for the defense of their faith, and in many instances went armed to their public meetings. The movement became so formidable that the Government pronounced illegal all armed assemblages for religious purposes. Richard Cameron, whose father, a small shop-keeper, had given him a good education, joined the ranks of the Nonconformists, and became so obnoxious to the authorities that he was compelled to take refuge in Holland. He returned in 1680, and shortly after the defeat of the Covenanters at Bothwell Bridge, in that year, was slain in a skirmish at Aird's Moss. The few troops he had been able to collect, and at whose head he was killed, formed the nucleus of the Cameronian regiment of to-day. Consult: Cunningham, *Church History of Scotland* (Edinburgh, 1883); and Burton, *History of Scotland* (London, 1873).

CAMEROON, kä'me-rōōn'. See KAMERUN.

CAMILING, kä'mê-lēng'. A town of Luzon, Philippines, in the Province of Tarlac, about 16 miles northwest of Tarlac. Population, 24,000.

CAMIL'LA. In Roman fable, a virgin wonderfully swift of foot, who aided Turnus against Æneas (Vergil, *Æneid*, vii. 803). She was said to be a daughter of Metabus, King of the Volscian town Privernum (Piperno).

CAMILLE, kȧ'mēl' (Lat. *Camilla*). (1) The heroine of Corneille's *Les Horaces*. Her lover is one of the Curiatii killed by her brothers, as in the old Roman legend on which the play is founded. When she denounces the act, and the patriotism which caused it, she is stabbed by her brother. (2) The heroine and title-character of the English adaptation of *La Dame aux camélias*. Camille is Marguerite Gautier in the original.

CAMIL'LO (Lat. *Camillus*). (1) A Sicilian lord who warns Polixenes of Leontes's designs against his life in Shakespeare's *Winter's Tale*. He escapes to Bohemia with the former monarch and remains there until the reconciliation of Polixenes and Leontes at the close of the piece. He is instrumental in bringing about the marriage of Florizel and Perdita. (2) The husband of 'the white devil' in Webster's play of the latter name. He meets his death through the agency of the Duke of Bracchiano, his wife's paramour. See COROMBONA, VITTORIA.

CAMIL'LUS and **CAMIL'LA** (Lat.). The names applied in ancient Rome to the boys and girls who shared in sacrificial ceremonies. If they were designed for the priesthood, it was necessary that their parents should be still living and free-born.

CAMILLUS (Lat.). A pseudonym used in journalistic writing by Fisher Ames. It was used also by Alexander Hamilton and Rufus King.

CAMILLUS, MARCUS FURIUS (B.C. ? c.365). A celebrated Roman patrician who first makes his appearance as consular tribune (B.C. 403). His military career was a series of unbroken successes, according to the accounts which have come down to us; but these accounts were shown by Niebuhr to possess a considerable admixture of mythological or poetic fiction. In 396 Camillus was made dictator, during the Veientine War, in which he mined and captured the city of Veii; but the proud splendor of his subsequent triumph offended the Roman populace, who were still further displeased when Camillus demanded a tithe of the spoils of Veii, in order to fulfill a vow made to Apollo, on condition of victory. In 394 Camillus was again elected consular tribune, and besieged Falerii, whose inhabitants, after bravely defending themselves, were led by a magnanimous act of Camillus to yield unconditionally. Afterwards, Camillus, being accused of peculation, and foreseeing certain condemnation, banished himself from Rome, 391, and lived in retirement at Ardea, until Brennus, at the head of his wild

Gauls, had swept through Etruria, and captured and destroyed the whole of Rome except the Capitol. Camillus was now recalled and appointed dictator a second time. He achieved a decisive victory over the invaders, rebuilt Rome, and obtained new victories over the Volsci and others. In 386 he was elected dictator for the third time, but refused the office. In 381 Camillus was victorious in the war of Rome against Præneste and other Latin towns: and in 368 he was elected to his fourth dictatorship, but abdicated during the same year. In 367, when war broke out with the Gauls, Camillus, though a very old man, accepted the dictatorship for the fifth time, defeated the barbarians near the site of Alba Longa, and made peace between patricians and plebeians. After this he erected near the Capitol a temple to Concord, and, having retired from public life, died about 365, of the plague, lamented by the whole Roman people.

CAMINATZIN, kä'-mê-nå-tsēn', or **CACUMAZIN** (? -1520). King of Tezcuco, nephew or cousin of Montezuma, and one of the leaders of the war party among the Mexicans after the capture of the King by the Spaniards. Caminatzin successfully opposed every effort of Cortes to make peace with the natives of the City of Mexico, but was finally taken captive through the instrumentality of Montezuma. He perished on the night of the evacuation of Mexico by the Spaniards (the *noche triste*), June 30, 1520.

CAMISARDS, kăm'ĭ-zärdz (Fr., from OF. *camise*, smock, less probably from Fr. *camisade*, attack by night). The active participants in the Protestant revolt of 1702 in the Cévennes, a mountainous region in Southern France, against the persecutions that followed the revocation of the Edict of Nantes. (See NANTES, EDICT OF.) The Camisards belonged to the Romance-speaking people of Gothic descent, who took part in the earliest movements toward religious reform. Calvin was warmly welcomed when he preached at Nîmes, and Montpellier became the chief centre for the instruction of Huguenot youth; but it was in the triangular mountainous plateau called Cévennes, and chiefly among the small farmers, the cloth and silk weavers, and the vine-dressers, that Protestantism was most widely diffused. These people, who were of a hardy and inflexible character, not unlike the Covenanters of the Scottish Highlands, were imbued with the stern principles of Calvinism, readily kindled to the exhortations of their preachers, and were capable of a stubborn resistance. The Edict of Nantes of 1598 and the moderate and conciliatory policy of Richelieu had brought France relief from religious strife, but a new policy was introduced under Louis XIV., who, conceiving that the internal political exigencies of the realm demanded a uniformity of worship throughout its extent, concluded that he would no longer tolerate heresy. A policy of gradually destroying the privileges of the dissenters was begun. They were shut out from public offices and trade corporations; they were forbidden to marry with Roman Catholics, and the conversion of their children seven years old and upward was encouraged and almost enforced. In October, 1685, the Edict of Nantes was finally revoked. All dissenting churches were to be destroyed, religious meetings were forbidden under pain of imprisonment and confiscation of property; all pastors who would not stop preaching at once and change their faith were to be banished within fifteen days; exemption from taxes and increased salaries were promised to converted ministers. Huguenot schools were suppressed, and all children were to be baptized and brought up in the Roman Catholic faith. All Huguenots, except ministers, were prohibited from going abroad, and the property of those who had already gone was declared forfeited unless they returned within four months. In carrying out this harsh decree the most savage persecution was indulged in. Torture, hanging, insults worse than death to women, the galleys and imprisonment for life were the ordinary occurrences for the next sixty years. (See DRAGONADES.) The number of Huguenots who fled from France at this period has been estimated as high as 600,000; but a more conservative and reliable figure would place it at 250,000.

In the Cévennes, however, the people were too poor to escape, and all over Languedoc the Huguenots assembled for purposes of worship in secret. A religious ecstasy ran through the country, and so-called prophets appeared among the people. In connection with this phase of the excitement, there were noted those abnormal physical and mental conditions which always follow prolonged fasting and vigils under strong religious excitement. Louvois, Louis XIV.'s War Minister, determined to put down this movement in an exemplary manner. An army of 40,000 was raised, and forts were erected at Nîmes, Saint Hippolyte, Alais, and Anduze. The Abbé du Chaila, a Roman Catholic missionary from Siam, had been appointed inspector of missions in the Cévennes. He became an object of particular aversion to the fanatics on account of his repressive measures in retaliation for their excesses and bold defiance. His assassination, July 23, 1702, was the first blow in the war. There was to have been a general massacre of Roman Catholic priests, but the plan failed, and the originator, Esprit Séguier, soon fell. He was succeeded by La Porte, an old soldier, who, as his forces increased, assumed the title of Colonel of the Children of God, and named his country the Camp of the Eternal. His captains were selected from those on whom the prophetic influence had fallen, such as the forest ranger, Castanet, the wool-carders, Condère and Mazel, and the soldiers, Catinat, Joany, and Ravenel; but the most famous were Roland and Jean Cavalier, the baker's boy (see CAVALIER, JEAN). For three years the Camisards held out. Against them was sent an army of 60,000 men, among them an Irish brigade, which had just returned from the persecution of the Vaudois. A policy of extermination was commenced, and in the upper Cévennes alone 466 villages were burned, and nearly the entire population put to the sword. The insurgents, on the other hand, indulged in acts of violence against the Catholic population and priesthood, of whom more than 4000 are estimated to have perished. Catholic churches were burned in large numbers. Clement XI. issued a bull against the "execrable race of the ancient Albigenses," promising remission of sins to the holy militia which was now formed among the Roman Catholic population under the name of Cadets of the

Cross. The formidable force brought against them induced Cavalier to listen to proposals, and he finally assented to a surrender on being guaranteed liberty of conscience, the right of assembly outside of walled towns, the liberation of all his people then in durance, and the restitution to emigrants of their civil rights and property. Still the greater part of the army, under Roland, Ravenel, and Joany, refused, and insisted upon the complete restoration of the Edict of Nantes. The Camisards continued the war until the beginning of 1705, at which time their leaders had been killed or dispersed, and they had become disorganized. In 1711 all outward signs of the Reformed religion had disappeared, and on March 8, 1715, a few months before his death, Louis XIV., by a special medal and by proclamation, announced the entire extinction of heresy. Fourteen years afterwards, in spite of the strictest surveillance, aided by military occupation, there had been organized in Languedoc 120 churches, which were attended by 200,000 Protestants. Persecution could not utterly suppress them; but it was not until 1775 that the last galley slave from Languedoc was liberated, and not until 1789 that the National Assembly repealed all the penal laws against Protestantism. Consult: Baird, "The Camisard Uprising," in *Papers of the American Society of Church History*, Vol. II. (New York, 1890); Bray, *The Revolt of the Protestants of the Cévennes* (London, 1870); Smiles, *The Huguenots in France After the Revocation of the Edict of Nantes* (London, 1877); Goiffon (ed.), *Relation historique de la révolte des fanatiques ou des Camisards* (Nîmes, 1874): Louvreleuil, *Le fanatisme renouvelé* (Avignon, 1702-07). See Cévennes.

CAM′LAN. A famous battle in Arthurian legend. It saw the death of Arthur and the dissolution of the Round Table. Antiquarians place it in Cornwall, England, and set its date either in A.D. 537 or 542. See Arthur, King; also Modred.

CAMLET (Ar. *khamlat*, camlet, from *khaml*, pile, plush; at an early period folk etymology wrongly referred it to *camel*). A fabric originally made of camel's hair, and more recently of the hair of the Angora goat. At present camlets are woven from wool alone, or from wool and cotton or linen mixed, and spun hard.

CAMMERHOFF, käm′mẽr-hôf, John Christophe Frederic (1721-51). A Moravian bishop and missionary in America. He was born near Magdeburg, Germany; became a bishop of the Moravian Church in 1746, and in the same year came to America, where until his death he acted as Bishop Spangenberg's assistant. He devoted his attention largely to missionary work among the Indians, especially among the Iroquois, and met with considerable success in gaining converts. He was adopted into the Turtle tribe of the Oneidas, under the name Gallichwio ('A Good Message'), and for more than a generation was remembered with singular respect and veneration by the Indians of the Confederacy. His death was caused by the exposures and hardships incident to a journey of 1600 miles to Onondaga, which he made in 1750.

CAMÕES, kȧ-mōɴsh′ *or* kȧmō′éɴsh, commonly written in English Camoens, Luiz de (c.1524-80). The greatest poet of Portugal, who exerted an important influence on the national drama, and developed the Portuguese lyric to its highest perfection, but owes his fame mainly to the celebrated historical epic, *Os Lusiadas.* Son of a sea captain, who was early lost in a shipwreck, and descendant of a family of distinction and rank, Camões was born in Lisbon—or more probably in Coimbra—in 1524 or 1525, about the time of the death of Vasco da Gama, to whom he was related, and whom his grandfather, Antão Vaz, had accompanied on his first voyage to India. He is supposed to have attended the University of Coimbra, although his name does not appear upon the records. At all events, he early showed remarkable proficiency in the classics and in contemporary literature, presumably due to the guidance of his uncle, Bento de Camões, who was then prior of the famous Santa Cruz monastery. It was during these early days in Coimbra that Camões was inspired by some fair but unknown maiden, whom he celebrated in a series of canzoni, sonnets, and elegies, Petrarchian in form and platonic in spirit, but notable for their purity of diction and grace of form. Having finished his studies, Camões went to Lisbon in 1542, where he frequented the Court and conceived a romantic passion for Catherina de Athaide, one of the Queen's ladies of honor, whom he celebrated under the anagram of Natercia, and whose complaisance was the beginning of all his troubles. Banished from the Court and separated from the woman he loved, Camões joined the expedition of John III. against Morocco, where he served two years, losing an eye during a naval engagement in the Strait of Gibraltar. On his return to Lisbon, he found no more praise for his bravery than formerly for his poems. Disappointed in all his hopes, he determined to leave his native land forever, and sailed for India as a common soldier. For sixteen years he led an adventurous life in the East, unprosperous for the most part, though for a time he held a lucrative position at Macao, as administrator of the effects of deceased persons. But he misused his powers, made enemies by his writings, incurred debts, and suffered misadventures in love. At last he turned his steps homeward, and after disheartening delays and countless hardships, reached Lisbon once more, in 1570, only to find it overrun with the plague, in the throes of the Inquisition, and governed by a young, feeble, and visionary monarch. Nevertheless he published his epic, the *Lusiad*, the only valuable possession which he had brought back from all his wanderings, and dedicated it to the young King, Sebastian, who was very gracious; but all the patronage bestowed upon the author was a niggardly pension of about $20, and permission to frequent the Court. Camões survived a few more troubled years, living with his aged mother. When Sebastian undertook the African campaign, his patriotic zeal flamed up once more, though he could not accompany the King either as poet—since Diogo Bernardes and Cortereale were preferred to him—nor as soldier, because too old. The news of the defeat of Alcacer-Quebir broke his heart. In a letter, the last lines that he wrote, he says: "It was not enough that I should die in my fatherland; I am dying with it." He died in a hospital in 1580, and his interment passed almost unnoticed.

The *Lusiad* (*Os Lusiadas*, The Lusitanians) celebrates the chief events in the history of Portugal, and is remarkable among modern epics for the admirable manner in which it has imitated the true national and popular spirit of ancient epic poems. Among the most famous passages are the tragic story of Iñes de Castro, and the apparition of the giant Adamastor, who appears as the Spirit of the Storm to Vasco da Gama when passing the Cape. The metre of the *Lusiad* is the familiar *ottava rima* of the Italian poets, and his treatment of it is full of charm. The chief interest of the poem is due to the fiery spirit of patriotism which pervades it, and its intrinsic beauty has made it one of the masterpieces of what Goethe termed the 'world-literature.' It has been translated into all the principal languages of Europe. Besides his epic, Camões wrote sonnets, odes, elegies, satires, epigrams, epistles, and three comedies—*Os Amphitryoes*, modeled upon Plautus; *King Seleucus;* and *Filodemo*. The most complete edition of his works is that of the Visconde de Juromenha (6 vols., Lisbon, 1860-69); a cheaper and more convenient edition is that of Theophile Braga (3 vols., Oporto, 1874). For his biography, consult: Adamson, *Memoirs of the Life and Writings of Luis de Camões* (London, 1820); Braga, *Historia de Camões* (3 vols., Oporto, 1873-75); Castello-Branco, *Luis de Camões* (Oporto, 1880); Burton, *Camões, His Life and His Lusiads* (London, 1881); Storck, *Luis de Camoens Leben* (Paderborn, 1890).

CAM'OMILE. See CHAMOMILE.

CAMONICA, kȧm'ô-nē'kȧ, or VALLE CAMONICA. A picturesque valley in the Province of Bergamo, North Italy, consisting of the basin of the Oglio River, inclosed by outlying and densely wooded ridges of the Rhætian Alps. It extends for 50 miles from northeast to southwest to Lake Iseo. It has iron, copper, and lead mines and marble and slate quarries. Its soil is fertile, and agriculture is well developed, maize, grapevines, and mulberry-trees being extensively cultivated.

CAMORRA, kȧ-mŏr'rȧ (OIt., frock, cassock). A secret society with ramifications throughout the former Kingdom of Naples, which exerts considerable influence among the lower classes in that part of Italy, and whose activity extends to higher official quarters. The members are called *Camorriste*. Under the Bourbons, Camorriste appeared in public places on all occasions of popular amusement, and levied contributions which their victims dared not refuse. They undertook the transport of smuggled goods, and contracted for the commission of serious crimes. Their readiness for violence and murder, and their close association among themselves, made them so much dreaded that Camorriste who had been thrown into prison succeeded in exacting money from their fellow-prisoners and from the jailer himself. When at the height of its power, the society had a central rendezvous in every large provincial town, and twelve in the city of Naples. Those who belonged to each of these sections of the society were under the absolute government of a chief elected by themselves, with whom was associated a treasurer. The latter had the charge of the common fund into which all the Camorriste of that section paid their entire gains for equal distribution among all their associates. Candidates for membership were obliged to show that they had been guilty neither of espionage nor theft; also that neither their wives nor their sisters were prostitutes, and to swear upon an iron crucifix a fearful oath of fidelity and secrecy. The candidate remained for a year, with the designation of *picciotto d'onore*, as a pupil under an old Camorrista; and having completed this probation, and given proof of his courage and obedience in circumstances involving danger of life, was advanced to the rank of a *picciotto di sgarro*. Finally, after a longer period, in which he had given proof of his fitness on a number of occasions, he was admitted to full membership of the society as a Camorrista. Each Camorrista carried about with him two knives of peculiar form, by which the members of the society recognized each other. They were held under the strictest discipline. Disobedience was punished by flogging, suspension from employment, or expulsion; treachery, by death. If two Camorriste quarreled, their chief decided the question between them; but in difficult cases a duel with daggers was the mode of decision. Under Ferdinand II. the Camorra was tolerated for political reasons. The Government of Francis II. endeavored to put down the society, and the police received instructions to seize and transport all known members of it. Those who remained entered into alliance with the Garibaldi Committee, and rendered essential service in the expulsion of the Bourbons. When the Neapolitan and Sicilian influence became strong in the politics of the new Italy (see ITALY), the Government attempted to use the Camorra in its struggle with brigandage, and thus strengthened the influence of the society by making it a political force, as it had often been under the Bourbons. Of recent years the Camorra has tended to assume more of the nature of a political machine, manipulated for the purpose of plunder. For a number of years the society was in full control of the municipal government of Naples, and included among its members the heads of the chief departments and practically the entire body of city employés. The association put up offices for sale, guaranteed officials immunity in the pursuit of peaceful peculation, and, in the last extreme, defended them in the courts. Conditions finally became so scandalous as to warrant (1899) the intervention of the Italian Government. Municipal government in Naples was suspended, while a royal commission was appointed to investigate the operations of the Camorra. The revelations of the commission led to the formation of an Honest Government League, which succeeded in completely defeating the candidates of the Camorra in the municipal elections of 1901. Consult: Monnier, *La Camorra* (Florence, 1863); Heckethorn, *The Secret Societies of All Ages and Countries* (New York, 1897); Umiltà, *Camorra et Mafia* (Neuchâtel, 1878); Blasio, *Usi e costumi dei camorriste* (Naples, 1897).

CAMOUFLET, kȧ-mōō'lȧ̂, *Fr. pron.* kȧ'mōō'-lȧ̂'. See MINES AND MINING, MILITARY.

CAMP, MILITARY. A collection of tents or huts for the shelter of troops, in a position, or on a piece of ground, specially adapted or prepared for such occupation. The evolution of the modern camp, or military encampment, is practically the history of modern armies, strategy, engineering, and sanitation. Of ancient camps the Romans give us the best example. The advance party consisted of a tribune and several centurions, whose duty it was to select a suitable site for the camp, marking out, first of all, a spot for the prætorium, or general's tent, round which, as a centre of the whole system, the rest of the camp was marked out. The camp streets were broad, measuring from 50 to 100 feet, and allowance was always made for the *forum*, or public market-place. Polybius (in the Second Century B.C.) is authority for the full details of the Roman camp system. With regard to their general description, he states that the best conception which can be formed of a Roman camp of the more permanent kind is by regarding it as a military town. According to the same authority, the Greeks trusted mainly to the judicious selection of their ground, and regarded the natural advantages which they thus secured as supplying in a great measure the means of artificial defense. The Greeks, consequently, did not use the regulation type of camp so rigorously adhered to by the Romans. The Roman plan seems to have been the one most generally adopted through the Middle Ages, with such additions as new arms, new formations, and new branches necessitated. Modern camps, in home countries or possessions, are chosen for their particular local advantage, sanitation and the general health of the troops being the first consideration. In time of war, or when campaigning in an enemy's country, there must be added precautions against attack, locating the camp in a place giving every possible natural advantage. Care is taken that there are no commanding positions within range where an enemy's artillery could be effective; that it is capable of defense; that it is roomy and safe enough to assemble the troops or get under way without hindrance or confusion; and that there are water facilities for man and beast. These and such other rules as circumstances may dictate form a general basis throughout armies of the civilized world. In the United States Army camps are organized according to directions given in the drill regulations. See ENCAMPMENT.

CAMP, kăN, MAXIME DU. See DU CAMP, MAXIME.

CAMPA, kăm′pȧ. See ANTI.

CAMPAGNA, kȧm-pä′nyȧ, GIROLAMO, called de Vergna (1552-c.1623). An Italian sculptor. He was born in Verona, and studied under Sansovino and Cataneo, many of whose works he completed. His best-known original productions consist of the isolated altar in the church of Santi Giovanni e Paolo, Venice, and the bronze group representing Christ resting on a globe carried by the four Evangelists, at San Giorgio Maggiore, Venice.

CAMPAGNA DI ROMA, kȧm-pä′nyȧ dē rō′mȧ (It., plain of Rome). An undulating, uncultivated, and unhealthful plain of Italy surrounding Rome, including the greatest part of ancient Latium. Applying the name in a broad sense to the district extending from Cape Linaro, south of Cività Vecchia, to Terracina, beyond the Pontine Marshes, its length is about 90 miles, and its breadth inland, to the Alban and Sabine hills, ranges from about 25 to 40 miles. A broad strip of sandy plain skirts the Mediterranean. The ground, which never rises higher than 200 feet above the sea, is almost entirely volcanic, and the lakes represent craters of extinct volcanoes. The vapors rising from this district, and especially from the Solfatara (q.v.), produce the pestilential atmosphere styled *aria cattiva*. The number of inhabitants is very small, and in summer they are driven from the Campagna di Roma by its pestilential air, and seek shelter in Rome and other neighboring places. In autumn herdsmen descend from the Apennines to the Campagna di Roma with their herds, the pasture in some parts being rich and abundant. Until the Fifth and Sixth centuries A.D. the Campagna di Roma was well inhabited, though not very healthful. In the last century of the Roman Republic and under the emperors, it was filled with the luxurious villas of wealthy Romans. The invasion of the barbarians began the devastation of the Campagna di Roma, and the insecurity of the region during the Middle Ages and the failure of the water-supply led to its gradual depopulation and the increase of the malignant conditions. During recent years, improved drainage, the planting of eucalyptus trees, and other works undertaken by the Government have done much to make the Campagna di Roma more healthful and lead to its gradual reclamation. The peculiar scenic aspects of the Campagna, with its many remains of Roman structures, combined with the characteristic atmospheric effects, have rendered it an inspiring subject for painters.

CAMPAGNOLA, kăm′pȧ-nyō′lȧ, DOMENICO (c.1490-c.1564). An Italian painter and engraver. He was born in Padua, and studied in the school of Titian, where his proficiency is said to have aroused the jealousy of his master. His best-known works are four pictures of prophets, in the Venice Academy; oil pictures in the Scuola del Carmine, Padua; and fresco paintings in the Scuola del Santo, Padua, which are said to rival those of Titian in the same place. His etchings are executed in a masterly style. The best-known are the "Descent of the Holy Spirit on the Day of Pentecost" and the "Assumption of the Virgin."

CAMPAIGN, kăm-pān′ (Fr. *campaigne*, *campagne*, open country, military operations; Med. Lat. *campania*, level stretch of country, from Lat. *campus*, field), MILITARY. A connected series of military operations having a definite purpose and object. It may apply to the whole field of hostilities, or to each separate and distinct command, if such command is operating with its own programme. For example, in the Civil War of 1861-65, may be cited General Grant's campaign, General Sherman's campaign, General Lee's campaign; while, on the other hand, under the title of the Egyptian Campaign (1882) was embraced every operation of the entire war.

CAMPAIGN, THE. A poem with a Latin version, by Joseph Addison, written at the instance of Lord Godolphin, to celebrate the battle of Blenheim in 1704. The amazing success of the piece was largely due to its happy description of Marlborough as one who "rides the whirlwind and directs the storm." It gained for the author first a commissionership of appeals and then the office of Under Secretary of State.

CAMPAN, kän'pän', Jeanne Louise Henriette Genest (1752-1822). A French author. She was first lady of the bedchamber to Marie Antoinette, and her faithful companion till they were separated at the sacking of the Tuileries, August 10, 1792. She then established a school at Saint-Germain, and later won the favor of Napoleon, who made her superintendent of an academy at Ecouen founded by him for the education of daughters and sisters of members of the Legion of Honor. On the abolition of the school in 1814, she retired to Mantes, where she died, among friends, but saddened by the calumnies of Royalists, who could not forgive her connection with Napoleon. She left some interesting and valuable *Mémoires sur la vie privée de Marie Antoinette* (1823), followed by *Journal anecdotique* (1824), a treatise, *De l'éducation*, and some pedagogical essays. *Correspondance inédite avec la reine Hortense* (1835).

CAMPANA, kȧm-pä'nȧ, Fabio (1819-82). An Italian composer, born in Leghorn. He was educated at the Musical Lyceum in Bologna, and in 1850 went to London, where he remained, teaching and composing, until his death. His works consist of *Caterina di Guisa* (1838); *Giulio d'Este* (1841); *Esmeralda* (1869); and many songs and romances.

CAMPAÑA, kȧm-pä'nyȧ, Pedro (1503-80). A Flemish-Spanish painter. He was born in Brussels, and his name is said to have been originally Pieter de Kempeneer. He completed his studies in Bologna and Rome, and established an academy in Seville in 1547. His famous "Descent from the Cross" (1548), now in the cathedral, was a favorite study of Murillo. Later in life he returned to the Netherlands. The pictures of Campaña are full of life, and are characterized by truthful delineation and powerful coloring. Several of them are at present in various churches of Seville.

CAMPANELLA, käm'pȧ-nĕl'lȧ, Tommaso (1568-1639). An Italian monk and philosopher. He was born in Stilo, Calabria, and studied in Naples and Cosenza. His *Philosophia Sensibus Demonstrata*, which included a defense of Telesius against the scholasticism of the Aristotelians, was published in 1591. He was accused of heresy and of conspiring against the Government, and spent twenty-seven years in prison at Naples, during which time he wrote much, one of his works being his famous "City of the Sun," which has been translated into English by T. W. Halliday, and published in *Ideal Commonwealths* (Morley's *Universal Library*). He was released through the intervention of Pope Urban VIII., but renewed persecutions compelled him to seek refuge in France, where he remained until his death. He was kindly received by Richelieu, and granted a pension of 3000 livres by Louis XIII. He expounded a philosophy many of whose tenets resemble the views of Descartes and Kant. His works, eighty-two in all, and treating of many different subjects include: *De Sensu Rerum et Magia* (1620); the *Civitas Solis*, mentioned before (printed with his *Philosophia Epilogistica Realis*, 1623), a description of a philosophic republic; and *Atheismus Triumphatus* (1636), which assumes the character of an apologia. His complete works have been edited by d'Ancona (Turin, 1854). His sonnets were translated by J. A. Symonds, in a volume with those of Michelangelo (1878). For his biography, consult: Baldacchini (Naples, 1840), and Amabile (Naples, 1883-87), as well as Dareste, *Morus et Campanella* (1843).

CAMPANERO, käm'pȧ-nā'rō (Sp., bellman, from *campana*, bell). The bell-bird.

CAMPANERTHAL, kȧm-pä'nĕr-täl, or **KAMPANERTHAL**, Das. A work on the immortality of the soul by Jean Paul Richter, which derives its name from the beautiful valley of Campan in the Pyrenees, traversed by the Adour.

CAMPANHA, kȧm-pä'nyȧ (Portug., plain). A town of Brazil in the State of Minas Geraes, about 150 miles northwest of Rio de Janeiro (Map: Brazil, H 8). It is situated in a gold-mining region and has several churches, a Latin school, a hospital, theatre, etc. Population, nearly 7000.

CAMPA'NIA (Lat., from Lat. *campus*, plain, Gk. *Καμπανια*, *Kampania*). A district of ancient Italy lying along the Tyrrhenian Sea, and bounded on the land side by Latium, Samnium, and Lucania (Map: Italy, J 6). Originally inhabited by people of Oscan race, it was early invaded by the more civilized Greeks, who founded there the cities of Cumæ and Neapolis (Naples). At a later period it came under the Etruscan domination, but the bulk of the population remained Oscan in race and language until Roman times. Campania has always been noted for the volcanic character of the country. Besides Vesuvius (of which the first eruption in historic times was that which destroyed Pompeii in A.D. 79), the whole region north of Naples was and is a scene of volcanic phenomena. Here were the *Campi Phlegræi* of the Greek and Latin writers, the modern *Solfatara* or sulphur-field near Puteoli (Pozzuoli), and here, near Cumæ, was the Lake of Avernus, the fabled entrance to the lower world. Notwithstanding this gloomy character, the great plain of Campania was always noted for its wonderful fertility and its charming climate and scenery. The Romans, who overran it as early as B.C. 340, called it *Campania Felix* (Happy Campania). They did not succeed in Romanizing the inhabitants until after the time of Sulla. The coast of Campania then became a favorite resort for the wealthy Romans, who built handsome villas at Baiæ, Puteoli, Misenum, and elsewhere. Cicero had a villa at Pompeii. In his new reorganization of Italy, Augustus made Campania his first district (*regio prima*). The chief ancient towns were Capua, Cumæ, Neapolis, Nola, Pompeii, and Salernum.

CAMPANILE, kȧm'pȧ-nē'lȧ (It., from Med. Lat. *campana*, a bell). A name adopted from the Italian to signify a bell-tower of the large kind, and usually applied only to such as are detached from the church. This type of tower is found hardly at all outside of Italy, where it is the only prevailing kind of church tower. See Bell-Tower; Belfry; Minaret; Tower; Florence; Venice.

CAMPANINI, käm'pȧ-nē'nē, Italo (1846-96). An Italian tenor, born in Parma. He enlisted in the army of Garibaldi when 14 years of age, and took part in the fight before

Milazzo. Having discovered during the campaign that he had a fine voice, he studied singing in Parma, and made his first appearance as the notary in *La Sonnambula* in his native town. He sang with indifferent success in various opera companies until 1869. In that year he went to Milan and placed himself under the tuition of the celebrated Francesco Lamperti. After a thorough training he made his début in *Faust* at La Scala of Milan, and was pronounced by a critical audience to be one of the finest tenors of the age. In 1872 he made his London début as Genaro, in *Lucrezia Borgia*, and in 1873 sang with Christine Nilsson in New York. He was heard in the United States during several subsequent seasons and became the most popular operatic tenor of his day in the country. Endowed with a true tenor voice of great power and sweetness, he was equally equipped to sing lyric and dramatic parts; but he shone especially in rôles demanding manly passion and fervor, e.g. those of *Aïda, Carmen, The Huguenots,* and *Faust.* He was also a notable Lohengrin. His repertoire included nearly 100 operas and oratorios. In later years, partly owing to an affliction of the throat, his voice failed; but his fine method of producing it and his intelligent singing and acting kept him high in popular favor until a few years before his death. He died in Vigatto, near Parma.

CAMPAN'ULA (Med. Lat., dim. from Late Lat. *campana*, bell). A genus of plants of the order Campanulaceæ, distinguished by a bell-shaped corolla with five broad segments. The species number nearly 300 and they are found mostly in the higher latitudes of the northern hemisphere, at high elevations in temperate regions, and about the Mediterranean Sea. The species are mostly herbaceous and are grouped as annuals, biennials, and perennials. The flowers are blue, violet, or white, and many are cultivated as border plants. The name bell-flower or bellwort is given to many, and is sometimes extended to include all the species. One of the most common is the bellflower, *Campanula rotundifolia*, a perennial species indigenous to America, Europe, and Siberia. For illustration, see Plate of CAMELLIA, ETC. The Canterbury bell, *Campanula medium*, is a biennial species frequently cultivated. It will flower the first season if sown early and transplanted. Among annual species in cultivation are *Campanula erinus*, *Campanula macrostyla*, and *Campanula Americana*. *Campanula pyramidalis* with blue, lilac, or white flowers, *Campanula glomerata* with pale-blue flowers, and *Campanula murialis* are all worthy of cultivation. Formerly medicinal properties were ascribed to some species, and the name throatwort was given to *Campanula trachelium* in England, where it was held valuable in some affections of the throat.

CAMPAN'ULA'CEÆ (Neo-Lat., from Med. Lat. *campanula*, little bell), BLUEBELL FAMILY. A natural order of dicotyledonous plants, the species of which number about 1000, embraced in 59 genera. They are mostly herbaceous, a few only being trees or shrubs, and are characterized by alternate exstipulate leaves and usually by a bitter latex. The inflorescence is usually racemose; the flowers regular, 5-parted; and the fruit a capsule or berry. The flowers of most of the species are comparatively large, but in Phyteuma and Jasione they are small and massed in heads like the Compositæ. The Campanulaceæ are mostly found in the temperate and colder climates of the northern hemisphere and the flowers of many are quite ornamental. The fruits of one member of the family (*Canarina campanula*) which grows in the Canary Islands are edible. The chief genera are Campanula, Phyteuma, Jasione, and Lobelia.

CAMPAN'ULA'RIA (Neo-Lat., from Med. Lat. *campanula*, little bell). A 'bell-hydroid' of the siphonophorous family Campanularidæ, common about tide-covered rocks, and characterized by having the "hydroid heads inclosed in a calyx, [and] the medusæ, if free, with gonads on radial canals" (Davenport). These are known as bell-hydroids, and are numerous, the genus Obelia being specially common and well represented on the New England coast. See illustration under ALTERNATION OF GENERATIONS.

CAMPARDON, kän'pär'dôn', EMILE (1834—). A French author, born in Paris. He was educated at the Ecole des Chartes, and later became chief of a department in the National Archives. In this capacity he utilized a great number of documents in the preparation of his literary works, all of which are distinguished by marked originality and by a profound knowledge of the men and affairs of the Eighteenth Century. The following are a few of his principal publications: *Histoire du tribunal révolutionnaire de Paris* (2 vols., 1861); *Marie Antoinette à la conciergerie* (1862); *Madame de Pompadour et la cour de Louis XV.* (1867); *Voltaire, documents inédits* (1880); *L'académie royale de musique au XVIIIe siècle.*

CAMPASPE, kăm-păs'pê. A river of Victoria, Australia, which flows north through Dalhousie County and joins the Murray at Echua (Map: Victoria, D 3). The plains along its lower course are well cultivated. Length, about 120 miles.

CAMPASPE (Gk. Καμπάσπη). A mistress of Alexander the Great. Apelles is said to have taken her for the model of his "Venus Anadyomene."

CAMPBELL, kăm'b'l, or, *Scot. pron.* kăm''l. See ARGYLL, MARQUIS OF.

CAMPBELL, ALEXANDER (1788-1866). An American clergyman, the founder of the Disciples of Christ, or 'Campbellites.' He was born in Ireland and was educated at the University of Glasgow. He came to the United States in 1809, and settled in Bethany, Va., as pastor of a Presbyterian church, from which he soon departed and organized a society, now known as the Disciples of Christ, whose doctrine was that the Bible should be the sole creed of the Church. In 1841 he founded Bethany College (Bethany, W. Va.), and remained its president until his death. He established, in 1823, the *Christian Baptist*, which in 1829 became the *Millennial Harbinger*, and which he continued until 1863. He engaged in many controversies and published no less than fifty-two volumes, including hymn-books and a translation of the New Testament His most typical doctrinal works were *The Christian System* and *Remission of Sin.* He published *Memoirs of Thomas Campbell* (1861), his father and associate in his work. Consult

Richardson, *Memoir of Alexander Campbell* (Philadelphia, 1868). See Disciples of Christ.

CAMPBELL, Allan (1815-94). An American civil engineer and railroad president. He was born in Albany, N. Y., and at the age of 21 was chief engineer of a railroad. He built the first railroad ever operated in South America; was prominent in the construction of the Harlem Railroad, the Pacific Railroad, and that from Callao to Lima, Peru, and was president of the Harlem Railroad until succeeded by 'Commodore' Vanderbilt. He was appointed commissioner of public works of New York City in 1876, and during 1883 was comptroller of the city. In 1882 he was defeated as nominee of the Republicans and Independents for the office of mayor.

CAMPBELL, Bartley (1843-88). An American dramatist. He was born in Allegheny City, Pa., became a journalist and founded the *Evening Mail* in Pittsburg. He started a monthly magazine in New Orleans; but the success of his first play, *Through Fire* (1871), induced him to devote himself to dramatic authorship. *My Partner* (1879) was his greatest success. He was for a time manager of the Fourteenth Street Theatre, New York. He became insane in 1886 and died in an asylum.

CAMPBELL, Beatrice Stella Tanner (1867 —). An English actress, born in London, and married in 1884 to Patrick Campbell, who fell in the South African War in 1900. She was already well known as an amateur before she made her début on the professional stage, at the Alexandra Theatre, Liverpool, in 1888. In March, 1890, she appeared in London at the Adelphi, where she afterwards played again in 1891-93, creating several parts. She gained a wide reputation in *The Second Mrs. Tanqueray* (1893) at the Saint James Theatre, where also she appeared in *The Masqueraders* (1894). As Kate Cloud in *John-a-Dreams*, produced by Beerbohm Tree at the Haymarket in 1894, she made another success, and again as Agnes in *The Notorious Mrs. Ebbsmith*, at the Garrick (1895). Among her later performances have been those in *Fédora* (Haymarket, 1895); Ibsen's *Little Eyolf* (Avenue Theatre, 1896); and notably in her Shakespearean revivals with Forbes Robertson at the Lyceum, as Juliet (1895), Ophelia (1897), and Lady Macbeth (1898). In 1900 she appeared in a revival of *Magda* at the Royalty Theatre. In the seasons of 1901-02 and 1902-03 she visited the principal cities of the United States, presenting her best-known rôles.

CAMPBELL, Charles (1807-76). An American historian, born in Petersburg, Va. He graduated in 1825 at Princeton, was head of a classical school at Petersburg from 1842 to 1855, and subsequently was principal of Anderson Seminary in the same city. He was a contributor to the *Southern Literary Messenger*, edited the *Orderly Book* of Gen. Andrew Lewis for 1776 (1860), and published *The Bland Papers* (1840-43), and *An Introduction to the History of the Colony and Ancient Dominion of Virginia* (1849).

CAMPBELL, Sir Colin, Lord Clyde (1792-1863). A British field-marshal, born in Glasgow, Scotland, October 20, 1792. He was the eldest son of Colin Maciver, a carpenter. His maternal uncle, Colonel John Campbell, sent him to school at Gosport, and in 1807 introduced him to the Duke of York for an army commission. The Duke mistook him for a Campbell, and his uncle hushed the boy's half-uttered protest with the remark, "It is a good name to fight under." He was gazetted as Colin Campbell, ensign, in 1808; served in the Walcheren expedition, 1809; and by 1813 attained a captaincy. He fought through the war in the Spanish peninsula with distinction; took part in the expedition to the United States in 1814; and afterwards spent nearly thirty years in garrison duty at various English stations. He served in China in 1842, and was present at the attack on Chusan. He next served in the Punjab, India, commanding the left at the battle of Chillianwallah, then for three years commanded in the Peshawur district with uniform success against the hill tribes. He was rewarded with the C.B. and K.C.B., and at the outbreak of the Crimean War in 1854 was appointed commander of the Highland Brigade. He took a prominent part at the battle of the Alma; and with the Ninety-third Highlanders, in the immortalized 'thin red line,' beat back the Russian cavalry in their attack on Balaklava. His services were rewarded with promotion to the rank of major-general; he was created a Knight Grand Cross of the Order of the Bath, and received the cross of the French Legion of Honor and other decorations. He was appointed inspector-general of infantry, and in 1857, at twenty-four hours' notice, started for India to command the forces engaged in quelling the mutiny, which by his energy and judgment was soon utterly subdued, his relief of Lucknow being especially brilliant. A notable characteristic of Campbell's generalship was the care he took of his men, his victories being won with the minimum expenditure of the lives of his soldiers. For his exploits in India, Campbell, in 1858, was raised to the peerage as Baron Clyde, and the East India Company granted him an annuity of £2000. He returned to England in 1860, and in 1862 was made field-marshal. He died August 14, 1863, and was buried in Westminster Abbey. Consult Shadwell, *Life of Colin Campbell* (London, 1881).

CAMPBELL, Douglas (1839-93). An American lawyer and historical writer, born in Otsego County, N. Y. He graduated at Union College in 1860, studied law at Harvard, served for a time in the Civil War as captain of the 121st New York Volunteers, and was admitted to the New York bar in 1866. After about twenty years of practice, he retired, partly on account of ill health, to devote himself exclusively to the study of American history, and published a book, *The Puritan in Holland, England, and America, an Introduction to American History* (2 vols., New York, 1892), which attracted considerable attention and has identified Campbell's name with the theory that the legal and political institutions of the United States were ultimately derived, not from England, but from Holland—directly through the Dutch settlers of New York and indirectly through the Puritans of Massachusetts, who, before coming to America, had spent some years in Amsterdam and Leyden. Though the book displays considerable erudition, its thesis has met with little support among historical scholars. Campbell also published two pamphlets entitled, *Historical Fallacies Regarding Colonial New York* (1879); and *The Origin of American Institutions as Illustrated in the History of the Written Ballot* (1891).

CAMPBELL, Douglas Houghton (1859—). An American botanist, born in Detroit, Mich. He graduated at the University of Michigan in 1882 (Ph.D., 1886), and afterwards took supplementary courses at Bonn, Tübingen, and Berlin (1886-88). In 1891 he became lecturer on the evolution of plants at Stanford Jr. University. His principal work is *Elements of Structural and Systematic Botany* (1890).

CAMPBELL, George (1719-96). A Scotch clergyman, born in Aberdeen. He was educated at Marischal College, studied divinity in Edinburgh and Aberdeen, and was ordained to the ministry in 1748. He was appointed principal of Marischal College in 1759; in 1771 was made professor of divinity there, and in 1795 retired from both posts. He is chiefly known for his *Dissertation on Miracles* (1762), a reply to Hume's essay (1748). His *Philosophy of Rhetoric* (1776) was also highly valued.

CAMPBELL, Sir George E. (1824-92). An English statesman. He was educated in Edinburgh, Saint Andrews, and Haileybury. In 1858 he was appointed judge of the High Court of Judicature in Calcutta, and in 1867 chief commissioner of the Central Provinces of India. He then served several years in Parliament, but in 1871 returned to India as Lieutenant-Governor of Bengal. In 1874 he went back to England to become a member of the council of India. He took an active part in the agitation on the Eastern question in 1876, as a supporter of the policy advocated by Mr. Gladstone. His more important books include *Modern India* (1852); *India as it May Be; Handy Book of the Eastern Question* (1876); *White and Black in the United States; The British Empire* (1889).

CAMPBELL, James Edwin (1843—). An American politician. He was born in Middletown, Ohio, was educated in the public schools, studied law, and in 1863 enlisted as a gunner in the navy, serving with the Red River and Mississippi flotillas. He was prosecuting attorney of Butler County in 1873, served in Congress as a Democrat from 1882 to 1888; and in 1889 defeated Joseph B. Foraker for the Governorship of Ohio. In 1891 he was defeated by William McKinley, and in 1895 by Asa S. Bushnell.

CAMPBELL, James Valentine (1823-90). An American jurist, born in Buffalo, N. Y. He graduated at Saint Paul's College (College Point, L. I.) in 1841, and was admitted to the bar in 1844. Upon the establishment of the Michigan Supreme Court in 1857, he was appointed an associate justice. He was a professor in the law school of the University of Michigan from 1859 to 1885. His judicial decisions are highly valued. He edited Walker's *Chancery Reports* (1845), and wrote *Outlines of the Political History of Michigan* (1876), a subject in which he made much research.

CAMPBELL, John (? -1806). A British soldier, born in Strachur, Scotland. He entered the army in 1745, and fought with distinction in the Scottish rebellion (1745), and in Flanders (1747). During the French and Indian War in America he served as captain of the Forty-second Highlanders, and was wounded at Ticonderoga (1758). As lieutenant-colonel of the Forty-seventh Infantry he again came to America with his regiment in 1776 and was successively appointed major-general (1779), colonel of his regiment (1780), and commander of the British forces in West Florida, where he was eventually compelled to surrender Pensacola to the Spaniards, May 10, 1781. His advancement to the rank of general followed in 1797.

CAMPBELL, John (1779-1861). Lord High Chancellor of England. He was the son of a Presbyterian minister of Cupar, County of Fife, Scotland, where he was born in 1779. He was at first destined for his father's calling, and was sent at an early age to the neighboring University of Saint Andrews. But he had no inclination for a clerical life, and, when he had completed his academic studies, at the age of 19, he went to London and engaged in newspaper work. At the same time he became a student in Lincoln's Inn, where he was a pupil of the distinguished special pleader Samuel Warren, and in 1806 was called to the bar. While waiting for clients he became a court reporter and published four volumes of reports with learned notes. Notwithstanding his good sense and remarkable industry, success at the bar came slowly, probably owing to a certain hardness of disposition and the lack of attractive personal qualities. It was not until he had been at the bar twenty-one years, in 1827, that he was made a King's counsel. From this time on, however, his promotion was rapid. In 1830 he entered Parliament, where his zeal, his capacity for hard work, and attention to details made him a valuable member and a useful supporter of the Whig Party. He devoted himself with characteristic energy and persistency to the amelioration of some of the harsh and cumbrous features of the law; and his name is associated with several beneficial statutes of this character. He failed, however, in his favorite project of bringing about a general registry of land titles in England, such as exists in the United States, and this reform still remains to be effected in that country. In 1827 he was made the head of the great Real Property Commission, which made a searching inquiry into the state of the real property laws of England, and whose reports and recommendations have proved of inestimable value to subsequent generations of law reformers.

Campbell was an ardent supporter of Lord John Russell's first Reform Bill in 1831, was made Solicitor-General in 1832, and two years later was knighted and promoted to the post of Attorney-General. In the same year he was chosen the representative in Parliament for Edinburgh. He continued to represent Edinburgh down to 1841, and remained in the office of Attorney-General during that period, with the exception of the short time in 1835 when the Conservatives were in power. In 1841 he was made Chancellor of Ireland and a peer of the United Kingdom with the title of Baron Campbell of Saint Andrews, but held the office of Chancellor for only a few months, when the Melbourne Cabinet left office, necessitating his resignation. For the first time since boyhood, he found himself without regular daily labor, and at the mature age of 60 set to work to win the literary fame which he professed always to have secretly coveted. His first publication was a collection of his speeches at the bar and in the House of Commons. For three or four years after the publication of his speeches Campbell was engaged in the preparation of the *Lives of the Chancellors*, the first series of which appeared in 1845. In 1846 he joined the

Russell Cabinet in the capacity of Chancellor of the Duchy of Lancaster. His ministerial duties were not sufficiently arduous to interrupt his literary labors, and he proceeded to complete the *Lives of the Chancellors*, and to publish a supplemental series of *Lives of the Chief Justices of England*. Both works have enjoyed great popularity, but leave no doubt that the author was more fitted for a practical lawyer than for a man of letters. Though executed in a sprightly manner, these writings are without grace of style and represent to a painful degree the envy, the prejudices, and the want of sympathy which were leading traits of Campbell's character. He returned to more congenial labors in 1850, when he was appointed to succeed Denman as Chief Justice. He held the office for nine years, at the end of which he received the Chancellorship of England. He died in June, 1861. His *Life* has been written by his daughter (1881).

CAMPBELL, John (1840—). A Canadian scholar, born in Edinburgh, Scotland. He was educated at the University of Toronto and at New College, Edinburgh, distinguishing himself in both institutions. In 1868 he became minister of the Charles Street Presbyterian Church in Toronto, and in 1873 he was appointed professor of Church history and apologetics in the Presbyterian College, Montreal. He has contributed largely to learned societies and to Church reviews, and his work in theology and ethnology has been recognized both in America and in Europe. His chief single publication is *The Hittites: Their Inscriptions and Their History* (2 vols., 1890). For certain statements in an address on *The Perfect Father or the Perfect Book*, Professor Campbell was tried for heresy before the Presbytery of Montreal in 1893 and convicted. He, however, appealed to the Synod of Montreal and Ottawa and was sustained.

CAMPBELL, John Archibald (1811-89). An American jurist. He was born in Washington, Ga.; graduated in 1826 at the University of Georgia, and was admitted to the bar in 1829. His legal ability was recognized by President Pierce, who, in 1853, appointed him associate justice of the United States Supreme Court, an office which he held until the outbreak of the Civil War. Subsequently he served as Assistant Secretary of War in the Confederate Government, and was one of the peace commissioners at the Fortress Monroe conference in 1865. After the war he was imprisoned at Fort Pulaski, but was released upon parole, and resumed his law practice.

CAMPBELL, John Francis, of Islay (*Iain Ileach*) (1822-85). A Scottish-Celtic scholar. He was born in Edinburgh, December 29, 1822, and was the eldest son of Walter Frederick Campbell and Lady Eleanor Charteris, eldest daughter of Francis, seventh Earl of Wemyss. He was educated at Eton and Edinburgh, and occupied several Government posts. He was a meteorologist of some distinction and invented an instrument for recording the intensity of the sun's rays. In 1865 he published *Frost and Fire, Natural Engines, Toolmarks and Chips, with Sketches Taken at Home and Abroad by a Traveler*, and in 1883 a book on *Thermography*. But he is chiefly remembered for his collections of Scottish Gaelic folk-tales and ballads. In 1860-62 he published his *Popular Tales of the West Highlands* in four volumes, and in 1872 he brought out an important volume of Gaelic ballads under the title, *Leabhar na Feinne*. The tales were taken down conscientiously from the mouths of the people, and constitute the most valuable collection of the sort that has yet been made in any of the Celtic countries. The *Leabhar na Feinne* brings together all the accessible Scottish Gaelic ballads on Ossianic subjects. It was Campbell's intention to publish other volumes containing other cycles of ballads, but the plan was never carried out.

CAMPBELL, John McLeod (1800-72). A Scotch theologian. He was born at Kilninver, and studied in Edinburgh and Glasgow from 1811 to 1821, when he was licensed. He was inducted into the parish of Row in 1825, and after a trial by the Assembly for heresy in his doctrines regarding the Atonement, was deposed in 1831. From 1833 to 1859 he preached to an independent congregation in Glasgow. His chief work is the *Nature of the Atonement, and Its Relation to Remission of Sins and Eternal Life* (1856, 4th ed. 1873), which has had a more than slight influence upon Scottish religious thought. His further publications include *Thoughts on Revelation* (1862).

CAMPBELL, Thomas (1777-1844). An English poet, born in Glasgow July 27, 1777. He was educated at the University of Glasgow, where he was distinguished for his knowledge of Greek literature. In 1795 he went as tutor to Sunipol on the island of Mull. The scenery of the western Highlands, which made a deep impression on his mind, is reflected in his verse. Returning from Mull, he repaired to Edinburgh with the intention of studying law. This plan he, however, soon abandoned for literature. His first poem, *The Pleasures of Hope*, suggested to him while at Mull, was published in 1799, and went through four editions in a twelvemonth. After its publication, Campbell went to Germany, visiting Munich, Leipzig, and Hamburg, where he was staying at the time of the battle of Hohenlinden. During this period he wrote *The Exile of Erin* and *Ye Mariners of England*. Returning to Edinburgh, he published, in 1801, *Lochiel's Warning* and *Hohenlinden*. In 1803 he proceeded to London, and adopted literature as a profession. In 1805, through the influence of Fox, he was granted a royal pension of £200 a year. In 1809 appeared *Gertrude of Wyoming*, which bears the same relation to *The Pleasures of Hope* that Thomson's *Castle of Indolence* bears to *The Seasons*—a less brilliant and striking, but more mature and finished performance. In 1819 he published his *Specimens of British Poets*, containing an excellent introductory essay on poetry, and good biographies of the poets themselves. At this very time he was also delivering lectures on poetry. After this he edited the *New Monthly Magazine*, contributing to it several poems, among which is *The Last Man*. In 1824 he published *Theodoric, and Other Poems*. In 1826 he was elected Lord Rector of the University of Glasgow, and he received the unusual honor of reelection in the two following years. He published *The Pilgrim of Glencoe and Other Poems* in 1842. His later publications added nothing to his fame. He died in Boulogne, France, June 15, 1844, and was buried in Westminster Abbey. Campbell's verse is unequal in quality, but it is usually graceful. His lasting fame rests on *Hohenlinden* and the patriotic lyrics *Ye Mariners of England* and *The Battle of the Baltic.* Consult: Beattie, *Life and Letters of Thomas Campbell* (London, 1840); Redding, *Literary Reminiscences of Campbell* (London, 1860); *Poetical Works*, edited by Hill, with *Life* by Allingham (London, 1891).

CAMPBELL, William (1745-81). An American soldier, prominent as a militia officer in the Revolutionary War. He was born in Augusta County, Va., and received a good education. In 1767 he removed to the Holston Valley with his mother and four sisters, and in 1773 became one of the first justices of the peace in Fincastle County. He served under Colonel Christian in Lord Dunmore's War (q.v.) in 1774, joined Patrick Henry's Virginia forces in September, 1775, and in July, 1776, assisted in forcing Governor Dunmore from Gwynn's Island. Returning to the Holston Valley, he became lieutenant-colonel of militia in 1777, was a member of the commission appointed in 1778 to run the boundary line between Virginia and the Cherokees in accordance with a recent treaty, and in the following year was prominent in various partisan operations against the Tories. He served for some time in the Virginia House of Delegates, but, obtaining a leave of absence in June, 1780, took an active part in numerous contests with the Tories, and in the famous battle of King's Mountain (q.v.) on October 7, was the leader of the American forces. Early in 1781 he joined General Greene, and on March 15 took a conspicuous part in the battle of Guilford Court-House (q.v.); but resenting the failure of Colonel Lee, commanding the cavalry, to come to his aid at a critical moment in this action, he withdrew in disgust from the service. He then again became a member of the House of Delegates, but in June was appointed brigadier-general of militia, and served under Lafayette until his death in August. Lafayette said of him: "The glory which General Campbell acquired in the affairs of King's Mountain and Guilford Court-House will do his memory everlasting honor, and insure him a high rank among the defenders of liberty in the American cause." Consult a sketch in Draper, *King's Mountain and Its Heroes* (Cincinnati, 1881).

CAMPBELL, William, Lord (? -1778). The last English Governor of South Carolina, the youngest son of the fourth Duke of Argyll. He became a captain in the British Navy in 1762; was a member of Parliament in 1764, was Governor of Nova Scotia from 1766 to 1773, and in 1775 became Governor of the Province of South Carolina. Here, on the outbreak of the Revolution, he was active in stirring up the Indians against the Colonists, who forced him to take refuge on a British man-of-war. In 1776, during the British attack upon Fort Moultrie, he received a wound while aboard Sir Peter Parker's flagship, which afterwards resulted in his death.

CAMPBELL, William Wilfred (1861—). A Canadian poet, born in Berlin, West Ontario. His father, Thomas Swainston Campbell, and his paternal grandfather were both clergymen of the Church of England. His mother was a daughter of Major Francis Wright, of Walworth Manor House, Surrey, England. Educated in Toronto and in Cambridge, Mass., Campbell was ordained to the Episcopal ministry (1885), and after some experience in a New England parish, he became rector in Saint Stephen, New Brunswick (1888). In 1891 he resigned and removed to Ottawa, where he obtained a place in the civil service. In 1889 Campbell won attention by his fresh and musical *Lake Lyrics and Other Poems.* His way from descriptive verse to intenser lyrical expression is marked by *Beyond the Hills of Dreams* (1899). This volume contains several impassioned poems on patriotic and imperial themes; such as "Victoria," "England," "The World Mother," and "The Lazarus of Empire." Campbell has written a number of literary dramas, of which *Mordred* and *Hildebrand* were published together in 1895. See Canadian Literature.

CAMP'BELL-BAN'NERMAN, Sir Henry (1836—). A British politician, representing the Stirling district, Scotland, since 1868, and since February, 1899, Liberal leader in the House of Commons. He was born September 7, 1836, and is the younger son of the late Sir James Campbell, of Stracahthro, Forfarshire. His additional surname was assumed under the will of a maternal uncle, Henry Bannerman of Kent. He has received the M.A. degree from Cambridge and the honorary LL.D. from the University of Glasgow. Besides the county offices of justice of the peace and deputy lieutenant, he has held various positions in the Government. In 1871-74 and again in 1880-82 he was financial secretary to the War Office; secretary to the Admiralty, 1882-84; Chief Secretary for Ireland, 1884-85; and Secretary of State for War, 1886, 1892-95. In 1899 he was chosen leader of the Liberal Party in succession to Sir William Harcourt. In 1901 he became a member of the Civil List Committee.

CAMPBELL ISLAND. A lonely spot in the South Pacific, in latitude 52° 33′ S. and longitude 169° 9′ E. Though it is mountainous and measures only 36 miles in circumference, it is valuable on account of its harbors (Map: World, Western Hemisphere, P 2). It belongs to New Zealand, and is used as a provision depot, but is not permanently inhabited. It is also scientifically interesting, being volcanic, and displaying a rich and varied flora.

CAMPBELLITE. See Crappie.

CAMPBELLITES, The. (1) A religious denomination founded in the United States by the Rev. Alexander Campbell (q.v.). Once called the New Lights, they are still variously known as the Christian Church, the Church of Christ, and even the Reformers, though the name preferred by them is Disciples of Christ. (2) The followers of the Rev. John McLeod Campbell (q.v.), who in 1831, because of difference of faith about the Atonement, left the Church of Scotland. See Disciples of Christ.

CAMPBELTOWN. A royal burgh and seaport on the east coast of the peninsula of Kintyre, in Argyllshire, Scotland, 65 miles west-southwest of Glasgow, on a fine harbor or sea-loch (Map: Scotland, C 4). A sculptured granite cross stands in the principal street, and is supposed to have been brought from Iona. The town is famous for its whisky distilleries, and imports large quantities of barley. Coal is found in the vicinity. Its fisheries are important. Campbeltown is a favorite summer resort.

Population, in 1901, royal burgh, 5285; Parliamentary burgh, 8234; civil parish, 10,236.

CAMP-BIRD, or Robber. The Canada jay. See Jay.

CAMPE, käm′pe, Joachim Heinrich (1746-1818). A German teacher, lexicographer, and writer for children. He studied theology in Halle, and became a warm partisan of the educational reforms of Basedow (q.v.), whose place he took during the year 1777 as the head of the Philanthropenum in Dessau. A little later he devoted himself to the writing of educational works, and also built up a prosperous business as a publisher of pedagogical works. In 1787 he was appointed to reform the system of instruction in the Duchy of Brunswick. In 1789 he visited Paris and became an ardent advocate of the principles of the Revolution. His juveniles, all written for the purpose of instruction, comprise thirty-seven volumes. His *Robinson der Jüngere* ("Robinson the Younger") has been translated into many languages. He also published some lexicographical works.

CAMPEADOR, käm′på-ȧ-dôr′. An epithet used of warriors. In particular, a title of the Cid (q.v.).

CAMPECHE, *Mex. pron.* kàm-pā′chȧ. One of the Atlantic States of Mexico, occupying the south part of the peninsula of Yucatan, and bordering on Guatemala and the Gulf of Campeche (Map: Mexico, O 8). Its area is 18,087 square miles. The soil is for the most part sandy and unproductive, but there are good pasture-lands. The main products are rice, sugar, and salt. Population, in 1879, 90,413; in 1895, 88,302. The Indians form a considerable portion of the population.

CAMPE′CHE, or **CAMPEA′CHY**. The capital of the Mexican State of the same name, and a seaport town, situated on the Gulf of Campeche, in the Gulf of Mexico, at the mouth of the San Francisco River (Map: Mexico, O 8). The industries of Campeche are unimportant with the exception of shipbuilding, but it is the centre of the trade in Campeche wood, and also in wax. Its harbor is sheltered by a breakwater, but is too shallow for vessels of deep draught. The town has a college and a population of 17,000.

CAMPEGGIO, kàm-pĕj′ô, or **CAMPEGGI**, kàm-pĕj′ē, Lorenzo (1474-1539). An Italian prelate. In early life he was a lawyer, but after losing his wife he became an ecclesiastic and rapidly rose to the position of cardinal. In 1519 he was sent to England to preach a crusade against the Turks, but was unsuccessful. Henry VIII. made him Bishop of Salisbury in 1524, and he came again to England in 1528 to assist Wolsey in the case of Henry's divorce from Catharine. His efforts to bring about a reconciliation came to nothing, however, and the see of Salisbury was taken from him. At Nuremberg, in 1524, Campeggio tried to win back Luther to the Catholic Church. At the Diet of Augsburg, in 1530, he advised Charles V. to adopt a relentless policy toward the Protestants of Germany.

CAMP EQUIPAGE. Articles and materials necessary for the proper equipment of a camp. It includes, among other things, tents, furniture, fittings, cooking utensils, and articles of common use. The description and quantity of camp equipage will depend on the purpose and location of the camp, its permanent or temporary character, and the number of troops accommodated.

CAMPER, käm′pẽr, Pieter (1722-89). A Dutch anatomist and naturalist. He was born in Leyden, and studied medicine there. In 1750 he became professor in Franeker; in 1755 in Amsterdam; and in 1763 in Groningen, where he remained until 1773. On being elected a member of the State Council in 1789, he removed to The Hague, where he died. He was distinguished for the services he rendered both to human and comparative anatomy, to surgery, obstetrics, and medical jurisprudence, and was a skillful draughtsman. His collected writings, with plates, appeared under the title, *Œuvres qui ont pour objet l'histoire naturelle, la physiologie et l'anatomie comparée* (3 vols., Paris, 1803). For his observations on the facial angle, see Angle.

CAM′PERDOWN (Dutch, *Camperduin*, Downs of Kamp). A broad tract of low downs which borders the North Sea on the west side of the peninsula which separates it from the Zuyder Zee (Map: Netherlands, C 2). It takes its name from the neighboring hamlet of Kamp, about 25 miles north of Haarlem. It gives its name to the victory obtained off that part of the coast by the British Admiral Duncan over the Dutch fleet, October 11, 1797.

CAMPERIO, käm′på-rē′ô, Manfredo (1826-99). An Italian traveler, born in Milan. He traversed Turkey, visited Australia and the Sunda Islands, and upon the opening of the Suez Canal explored the Nile as far as Assuan, went thence to the East Indies, Ceylon, and Java, and, in the service of the Society for the Commercial Exploration of Africa, founded by him in 1879, traveled through Tunis, Tripoli, and Bengasi. He established, in 1876, the review *Esploratore*. Besides articles in periodicals he published *L'Eritrea nel XX. secolo* (1899), in which he urges the necessity of railway construction in the colony.

CAMPERO, kàm-pā′rō, Narciso (1815—). A Bolivian soldier and politician, President of Bolivia from 1880 to 1884, born at Tojo (now in Argentina). He became a brigadier-general in the Bolivian army, and for a brief period in 1872 was Minister of War. Upon the overthrow of Daza, he was elected President on April 9, 1880. He assumed command of the combined armies of Bolivia and Peru, but on May 26, 1880, was routed at Tacna. His administration, a tranquil one so far as concerned internal affairs, came to an end on August 1, 1884.

CAMP FOLLOWERS. Sutlers, servants, dealers in small wares, and sometimes natives of the vicinity, who travel with, or follow in the train of, an army on the march. They are invariably a source of trouble and responsibility to the commander of the army to which they attach themselves, and are often a source of danger.

They are not so much in evidence in modern campaigns as in the past, unless the campaign is being conducted in a wild or uncivilized country. Formerly, owing to the absence of railroads and steamships, armies had frequently to undertake long marches, with practically no base of supplies, or at the best having very meagre communication with such base, rendering necessary the carrying of great quantities of stores and supplies. Natives were employed for this work, and in instances where the roads were to be constructed or were in need of repairs, would also be used for that purpose. It has been stated that in February, 1839, when a Bengal army of 15,000 men left Shikapur for Afghanistan, it was accompanied by at least 85,000 camp followers.

In European countries, and in modern times, the presence of railroads obviates a certain amount of marching, and in conjunction with steamships keeps the army well supplied, rendering any large number of camp followers unnecessary. Those who do exist, however, are provided for in regulations, are subject to the articles of war, and are under the control of the commanding officer.

CAMPHAUSEN, kämp′hou-zen, Otto (1812-96). A Prussian statesman. He was born in Hünshoven, studied at the universities of Bonn, Heidelberg, Munich, and Berlin, in 1844 was elected councilor at Treves, and in 1845 became a member of the Ministry of Finance. In 1869 he was appointed Finance Minister. His administration, resourceful and cautious, marked a change from conditions of economic depression to those of great prosperity. Made accountable by his opponents for a subsequent reaction, attacked by even the Liberals, and at odds with Bismarck respecting the tobacco tax, he resigned with the rank of Minister of State.

CAMPHAUSEN, Wilhelm (1818-85). A German battle painter. He was born in Düsseldorf, where he was a pupil at the Academy, and professor from 1859. Among his works are: "Tilly at Breitenfeld" (1841); "Godfrey of Bouillon at Ascalon" (1845); "Charles I. at Naseby" (1851); "Blücher Meeting Wellington" (1857); "Meeting Between Bismarck and Napoleon III.;" and "Entry of Emperor William into Berlin" (1872).

CAMPHINE, kăm-fēn′ (*Camphor* + *ine*). The name applied to purified oil of turpentine, which has been used for burning in lamps. It is very volatile, and burns very freely, giving a white, brilliant light. With air its vapors form a dangerously explosive mixture.

CAMPHOR (Med. Lat. *camphora*, from Ar. *kāfūr*, camphor, which is derived through the Prākrit *kāpūra*, from Skt. *karpūra*, camphor), $C_{10}H_{16}O$. A substance obtained by the action of steam on the chipped wood of the camphor-tree (*Camphora officinarum*, or *Cinnamomum camphora*, Nees). The product of distillation with steam is freed from volatile oil by draining and pressing, and the crystalline mass remaining behind is purified by sublimation. Camphor has also been prepared artificially by oxidizing the hydrocarbon camphene, $C_{10}H_{16}$. Pure camphor is a colorless, transparent, crystalline substance, melting at 175° C. and boiling at 204° C. It has a characteristic odor and a somewhat pungent, aromatic taste. It is only sparingly soluble in water, but dissolves readily in alcohol, ether, chloroform, carbon disulphide, and other organic liquids. It has a tough consistency, but if digested with alcohol becomes hard and may then be readily pulverized. Camphor was introduced into Europe by the Arabs. It is now employed in the manufacture of celluloid and of explosives, and is often used in medicine. It forms an ingredient of various liniments and is often applied externally in gout and chronic rheumatism and to relieve pain in neuralgia; it is commonly administered internally as a remedy for a neurotic cold in the head. It is generally known as *common* or *Japan camphor*. Borneol, or Borneo camphor, is described in a separate article. See Borneol.

CAMPHOR′IC ACID, $C_8H_{14}(COOH)_2$. An organic substance obtained by the oxidation of camphor with nitric acid. It occurs in needle-shaped crystals, colorless, odorless, and of slightly acid taste. It is nearly insoluble in cold water, but dissolves readily in hot water as well as in alcohol, ether, fatty oils, and other organic liquids. Camphoric acid has been used in inflammatory conditions of the respiratory and urinary mucous membranes, but is now employed almost exclusively as an anhidrotic (q.v.). It proves most serviceable in the profuse night-sweats of phthisis.

CAMPHUYSEN, kämp′hoi-zen, Dirk Rafelsz (1586-1627). A Dutch theologian and poet, born at Gorkum. He was a partisan of Arminius and was persecuted on that account. Among his works is a compendium of his doctrines. He also left a number of religious poems, including a translation of the Psalms. He is said to have been a painter until his eighteenth year. The pictures attributed to him are probably by his nephew, Raphael Camphuysen (1598-1657), an artist, or by his other nephew, Raphael's brother, Govaert Camphuysen (1624-74), a painter. His works usually are landscapes with animals done in Paul Potter's style, and have been taken for that master's. They are to be found in Dutch museums and in private collections.

CAMPI, käm′pê, or **CAMPO**. A family of Italian painters, of the school of their birthplace, Cremona. Galeazzo (1475-1536), founder of the family, was an imitator of Perugino. His son and pupil, Giulio (1500-72), studied also with Giulio Romano at Mantua, but, like a true Eclectic, sought to acquire the merits of Titian, Raphael, and other great artists. His best works, which are good in color, are in Cremona, Milan, and Mantua.—Antonio (1522-c.1600) studied with his brother Giulio, with Giulio Romano and Costa at Mantua, and modeled his art especially upon Correggio. His style is brilliant and vigorous, and, for an Eclectic, original. Important works by him are at Cremona, Modena, Mantua, and Milan, and he painted at Madrid for Philip II; His "Saint Jerome in Meditation" is in the Prado. He was also well known as a portraitist, an architect, and a writer.—Vincenzo (c. 1530-91), also a pupil of Giulio, was less able than his brothers. Although he too painted religious pictures, he was more devoted to smaller panels, such as portraits and still life.—Bernardino (1522-c. 1590), probably a relative of the preceding, was the son of a goldsmith, Piero Campi, and studied with Giulio and with Ippolito Costa at Mantua. Although influenced by Raphael and Correggio, he imitated the works of Titian so exactly that it is difficult to distinguish his copies from the originals. His works are most numerous at Cremona, especially in San Sigismondo and San Domenico. He wrote a treatise on painting, *Parer sulla pittura* (1584). The celebrated portrait painter Sophonisba Angussola was a pupil of Bernardino Campi.

CAMPIDOGLIO, kȧm'pê-dō'lyō (It., Capitoline Hill, Lat. *Capitolium*). The Piazza di Campidoglio, with the famous group of palaces erected from Michelangelo's designs, occupies a depression on the Capitoline Hill in Rome between the two peaks of the Citadel and the Temple of Jupiter. The edifices consist of the Palace of the Senator, opposite the grand flight of steps leading up from the Piazza Araceli, and the Palace of the Conservators and the Capitoline Museum on either side. In the centre of the Piazza di Campidoglio stands a splendid antique equestrian statue in bronze of the Emperor Marcus Aurelius.

CAMPINAS, or **SÃO CARLOS DE CAMPINAS**, souN kär'lôs dȧ kȧm-pē'nȧs (Portug., plains). A town of Brazil on the Piracicaba, 70 miles northwest of São Paulo (Map: Brazil, H 8). There are large coffee and sugar plantations in the surrounding district. Population, 12,000.

CAM'PION. See Lychnis; Silene.

CAM'PION, Edmund (1540-81). An English Jesuit. He was born in London, was educated at Oxford, and in 1567 was ordained deacon, but as he could not consent to the Protestant formulary as required by the English Church, he went to Ireland, where it was expected that the University of Dublin would be revived. That plan failing, he went (1571) to Douai, and there joined the Society of Jesus (1572). In 1580 he returned to England as a missionary. The next year he published *Decem Rationes*. For this he was arrested, committed to the Tower, tortured several times on the rack, subjected to prolonged disputations, for which he had no time to prepare himself and could use no books, was tried for treason and convicted by hired witnesses, and was hanged at Tyburn, London, with several laymen. Consult Simpson, *Edmund Campion: A Biography* (London, 1867).

CAMPION, Thomas (? -1619). An English poet and musician, about whose life almost nothing, not even the date of his birth, is known. He appears to have traveled on the Continent, and to have received the degree of M.D. in a foreign university. In 1595 he published a volume of Latin elegiacs and epigrams, under the title *Poemata*. He ridiculed rhyme in the *Art of English Poesie* (1602); composed many masques for the Court of King James I., and became an authority on music, publishing four books of airs, songs with accompaniments (1610-12). For his masques, consult Nichols, the *Progresses*, etc., of Queen Elizabeth and of King James I. (London, 1788-1828).

CAMPISTRON, käN'pês'trôN', Jean Galbert de (1656-1723). A French dramatic poet. He was born in Toulouse, and at an early age went to Paris, where he became a follower of Racine. His works have neither well-marked character nor striking situations, but many of his tragedies were produced with success for several years. Among his best-known works are *Virginie* (1683); the libretto for Lully's opera, *Acis et Galatée* (1686); *Andronic* (1685), which has the same historical background as Schiller's *Don Carlos*; and *Tiridate* (1691). The best edition of his works is that of 1750 (3 vols.), which contains memoirs of his life. *Œuvres choisies* (Paris, 1810) were published by Auger. In 1701 he was received into the French Academy.

CAMP-MEETING. A series of religious meetings held in the open air, usually in the woods, and participated in by families or groups of persons from a distance, who live in tents or in simply built houses during the sessions and devote the greater part of the time to listening to preaching, which is always direct and fervent and is usually accompanied by a 'revival.' The first held in the United States was in 1799, at a settlement on Red River, in Kentucky, and was the outcome of the preaching of Rev. John M'Gee, a Methodist, his brother, a Presbyterian, and Rev. Mr. Hoge, also a Presbyterian, at a communion service. Their exhortations affected their audience so strongly that crowds came from the surrounding country to hear confessions and 'testimonies,' and the meeting, transferred from the small meeting-house to the adjoining forest, was protracted for several days, and was followed by others in different places. The number of persons attending one camp-meeting in Kentucky was estimated at 20,000. At first Presbyterians and Baptists united with the Methodists in holding these meetings, but they soon came to be confined to the last-named denomination, which in all its branches has been most enthusiastic in supporting them and in introducing them into all parts of the country, though even within the denomination they have met with opposition. In many States camp-meetings have lost some of the characteristics of early days, the places of meeting being fixed, and the life less simple. Not unfrequently secular instruction is a feature, schools of languages, music, art, etc., and lectures on various topics, filling the time not occupied by religious services. Among the many popular camp-meeting grounds of the Methodist Episcopal Church are Round Lake, N. Y., Ocean Grove, N. J., Martha's Vineyard, Mass., Lakeside, Ohio, Bartley, Neb., and Pacific Grove, Monterey, Cal.

Lorenzo Dow (q.v.) introduced camp-meetings into England in 1807, but the Wesleyan Conference refused (as it still does) to sanction them, and to this attitude was partly due the organization of the Primitive Methodist denomination in 1810. Consult: *An Essay on Methodism* (New York, 1849); J. Porter, *Revivals of Religion* (1877); S. C. Swallow, *Camp-Meetings* (1878).

CAMPOAMOR Y CAMPOOSORIO, käm'pô-ȧ-mōr' ê käm'pō-ô-sō'rê-ō, Ramon de (1817-1901). A Spanish poet, politician, and philosopher. He was born in Navia, September 24, 1817, and received a classical education in Santiago and at the Jesuit College of Saint Thomas in Madrid, which he left without finishing his course. He then began the study of medicine at the College of San Carlos, but abandoned it to devote himself to journalism and literature. Throughout his life, however, he kept a strong interest in physiological and physical science, and especially in chemistry. He entered political controversy with the *Historia crítica de las Cortes reformadoras* in 1837; was several times elected to the Cortes, where he distinguished himself as an orator; was appointed Governor of Alicante and Valencia in 1854; and engaged in a long controversy with Castelar which is represented by his *Polémicas con la democracia* (1862). He took no part in politics from the Revolution of 1868 until the succession of Alfonso XII. in 1874, after which he held several subordinate offices, was made counselor of state, and later life Senator. He refused the title of Grande de España. His attitude in politics was always that of a moderate conservative, distinguished for his eloquence and his chivalric faithfulness to the royal family.

His trend toward philosophical thought was shown in *La filosofía de las leyes* (1846), and confirmed in *El personalismo* (1850 and 1855); he attempted to expound his system in *Lo absoluto* (1862 and 1865) and *El idealismo* (1883), the two works by which he is best known outside of Spain. His philosophy is a somewhat incoherent and often self-contradictory eclecticism, tending on the whole to subjective idealism.

By far his most important work was done in poetry. Lightness, grace, and delicate sensibility marked his early verse: *Los ayes del alma* (1842), and *Ternezas y flores* (1858). The *Fábulas morales y políticas*, first published in 1842, were added to in many successive editions. His most characteristic short poems are to be found in the *Doloras* (1856-90, 18 editions, each containing new work), which created a new type of poem much imitated by the younger Spanish poets. These poems condensed into brief lyric form the expression of philosophical, ethical, and social ideas, treated sometimes with bitter irony, but always with feeling. He attempted long narrative poems in his epic on Columbus (*Colón*, 16 cantos, 1853 and 1857), and *El drama universal* (1873), but these are less successful than the shorter narratives, which contain some of his best work: *Los pequeños poemas* (1879, 1886); *Los buenos y los sabios* (1881); *El amor y el rio Piedra* (1882); *Los amores de Juana* (1882); *El trén express* (1885); *Nuevos pequeños poemas* (1887); *Humoradas* (1890). *La niña y el nido*, *Los grandes problemas*, and *Por donde viene la muerte*, are among the best. He also wrote many plays in verse, none of which succeeded on the stage. They are full of humor and feeling, and rich in ideas, but are lacking in dramatic movement. The best known are: *Una mujer generosa* (1838); *Dies Iræ* (1873); *El honor* (1874); *Guerra á la guerra*; *Así se escribe la historia* (1875); *Glorias humanas* (1885); *Cuerdos y locos* (1887); *El palacio de la verdad*, etc. He published his theory of poetry in *La poética* (1883), completed in a new edition (1890), and in *La metafísica y la poética* (1891). His last poems of importance are *El licenciado Torralba*, a philosophico-ethical narrative poem, and *Nuevos poemas* (1892). He became a member of the Spanish Academy in 1861.

Campoamor's narrative poetry at its best may be compared with that of Victor Hugo. In his usual choice of subjects he rather resembles Coppée, to whom, however, he is distinctly superior in conception and treatment. In poems of sentiment and thought, such as the *Poesías y fábulas*, and the *Doloras*, he has close affinity with Sully-Prudhomme, and the *Licenciado Torralba* attempts the same task as Sully-Prudhomme's *Bonheur*. In spite of these relations, he is the most original and independent of Nineteenth Century Spanish poets, and is by many considered the greatest of the last half-century. He is the poet of subjectivity *par excellence* in all Spanish poetry, and finds fit lyric expression for thought as do few poets of any country.

His *Obras completas* were edited by Montaner y Simon (Barcelona). Selections from his poetry were published (Madrid, 1879, and Leipzig, 1885). Consult: Juan Valera, *Estudios Críticos* (Madrid, 1864); Fr. Giner, *Estudios literarios* (Madrid, 1866); Melchior de Palau, *Acontecimientos literarios* (1889).

CAMPOBASSO, käm′pô-bäs′sô (It. *campo*, Lat. *campus*, field + *basso*, Late Lat. *bassus*, low). A city in South Italy, capital of the Province of Campobasso, 52 miles north of Benevento, on the east slope of Monteverde, in the heart of the Apennines, 2400 feet above the sea (Map: Italy, J 6). The climate is cool and healthy and the town has a ruined castle and walls, a cathedral, a theatre, excellent institutions of learning, important manufactures of cutlery, and a famous market to which good roads lead from the surrounding country. Population, in 1881, 15,000; in 1901, 15,030.

CAM′POBEL′LO (It. *campo*, Lat. *campus*, plain + *bello*, Lat. *bellus*, beautiful). An island of New Brunswick, Canada, situated just outside of the Maine, United States, boundary, at the mouth of Passamaquoddy Bay, an inlet of the Bay of Fundy, in latitude 44° 57′ N., and longitude 66° 55′ W. (Map: New Brunswick, C 5). The island, from nine to ten miles long, and from two to three miles wide, has a picturesque coast abounding in fiords, chasms, cliffs, and pleasant beaches. At the north end is a lighthouse 60 feet in height. The well-wooded interior is intersected in all directions by fine walks and drives. It contains copper and lead ores, but the industrial portion of the population is chiefly engaged in fisheries, and during the season in attending to the wants of the residents of the numerous summer homes and hotels, some of the best along the Atlantic coast. The island's development dates from its acquisition by a syndicate of Boston and New York capitalists in 1880. From 1767 it had been in the possession of Admiral William Owen's family. The United States is represented by a consular agent. Permanent population about 1200.

CAMPO-FORMIO, käm′pô fōr′myô, now officially written CAMPOFORMIO. A village in the Province of Udine, northern Italy, about 7 miles southwest of the city of Udine. It is celebrated for the treaty of peace concluded there, October 17, 1797, between Austria and the French Republic. After overrunning Italy, Bonaparte had crossed the Alps, and threatened Vienna. Austria therefore hastened to arrange preliminaries of peace at Leoben, April 18, 1797. In the treaty which was concluded by Bonaparte with the Count von Cobenzl at Campo-Formio, Austria ceded the Belgian Netherlands to France, and gave up Lombardy, to be incorporated into the Cisalpine Republic, and received as compensation most of the territories of the Republic of Venice (which Bonaparte had extinguished), including Venetia (with the city of Venice), Venetian Istria, and Dalmatia. France took the remaining territory of Venice, its possessions in Albania, and the Ionian Islands.

CAMPO MAJOR, käN′pô mȧ-zhōr′. A city in the Province of Alemtejo, Portugal, 11 miles northeast of Elvao (Map: Portugal, B 3). It is situated at an elevation of about 950 feet, has a meteorological observatory and manufactures wine and woolen goods. It was the scene of a siege in 1811 during the Peninsular War, which has been celebrated by Scott. Population, in 1890, 5846.

CAMPOMANES, käm′pȯ-mä′nȧs, Pedro Rodriguez, Count (1723-1802). A Spanish statesman and political economist. He was born in Asturias. His talents and learning were devoted to the advancement of his native country. He acquired a high reputation for legal attainments and was appointed fiscal and subsequently president of the Supreme Council of Castile. He held other high offices, among them that of director of the Royal Academy of History in Madrid. By his enlightened view of state policy as well as by his writings, which gave him a place among the most eminent Spanish authors, he obtained a great reputation throughout Europe. His attention was chiefly devoted to economic studies. He pointed out how the impoverishment of Spain was due to oppressive laws, that tended to discourage commerce and industry. He sided with Count Aranda in his policy of expelling the Order of the Jesuits from the Spanish dominions. Campomanes was a man of great intelligence and the highest probity, and gained the affection and admiration of all his associates. At the suggestion of Benjamin Franklin, Campomanes was chosen an honorary member of the Philosophic Society of Philadelphia. His chief works are: *Antigüedad maritima de la república de Cartogo* (Madrid, 1756); *Discurso sobre el fomento de la industria popular* (1771); *Discurso sobre la educación popular de los artisanos* (1775); and *Tratado de la regalia de amortización* (1765).

CAMPORI, kȧm-pō′rė, Cesare, Marquis (1814-80). An Italian historian, born in Modena. His masterpiece is the exhaustive biography, *Raimondo Montecuccoli, i suoi tempi e la sua famiglia* (Florence, 1876). A collection of his works was published posthumously under the title of *Memorie patrie, storiche e biografiche* (Modena, 1882). Consult Matteo Ricci, "Cesare Campori," in *Ritratti e profili politici e litterarii* (Florence, 1880).

CAMPOS, käm′posh (Portug., plains, Lat. *campus*, field). A city of Brazil, in the State of Rio de Janeiro, on the Parahyba River, which is navigable for small steamers to this point, about 30 miles from its mouth (Map: Brazil, J 8). It has good railroad connections, and canals extend to the coast. The city is lighted by electricity and contains several fine buildings. It controls an important trade as the centre of a fertile region producing sugar-cane, coffee, rice, and cotton, and has a number of sugar-refineries. Campos was founded in 1730. Population, in 1890, 78.036, one-half of whom are negroes.

CAMPOS. The Brazilian term for tropical prairies or savannas. Campos in which trees are common are called 'campos cerrados.' See Grassland and Savanna.

CAMPOS, Arsenio Martinez. See Martinez Campos.

CAMPOS SALLES, käm′posh sä′lĕsh, Manoel Ferraz de (1841—). A South American politician, and President of Brazil, born in São Paulo. He was admitted to the bar, was elected in 1867 and frequently thereafter to the Legislature of São Paulo, and in 1884 became a member of the Chamber of Deputies. As Minister of Justice, upon the proclamation of the Republic, he thoroughly reorganized the Brazilian system of law along lines subsequently accepted by the Constituent Assembly. In 1898 he was elected President of Brazil, as candidate of the Republican Party.

CAMPO SANTO, käm′pȯ sän′tȯ (It. *campo*, Lat. *campus*, field + *santo*, Lat. *sanctus*, holy). The Italian designation of a cemetery or burying-ground, but more especially for an inclosed place of interment, surrounded internally by an arcade, for the burial of persons of distinction. See Cemeteries.

CAMPO VACCINO, käm′pȯ vȧ-chē′nȯ. See Forum.

CAMPRODON, käm′prȯ-dōn′, Francisco (1816-70). A Spanish dramatic poet. He was born at Vich, Barcelona, and first attracted attention by his poem *La tornada de Tító*, written in the Catalan dialect, upon the return of the Spanish Army from the African War. Some of his dramas are adaptations from foreign works. The most important original one is *Flor de un dia* (1851).

CAMP′TONITE (named after Campton, N. H., where the first specimen was found). A term applied to certain igneous rocks of the nature of diorite, which occur in fissures in other rocks—i.e. in dikes. They are composed chiefly of hornblende and plagioclase, the former mineral being sometimes replaced by biotite. Iron ores and quartz are also usually present. The chemical composition of camptonite does not differ from that of diorite.

CAMP′TOSAU′RUS (Neo-Lat., Gk. *καμπτός*, *kamptos*, bent + *σαῦρος*, *sauros*, lizard). A genus of herbivorous, bird-footed dinosaurs of which remains are found in the Jurassic rocks of Wyoming. The genus is closely allied to the fossil genus Iguanodon of the European Jurassic, which it much resembles. The animal was lightly built, and as its five-toed fore limbs were small and apparently of little use in locomotion, it must have progressed on its three-toed hind limbs after the fashion of a bird. Its neck was rather short, but slender and bird-like, and its small head was provided with a horny beak. The tail was long and heavy. Three species have been recognized: of these the largest, *Camptosaurus amplus*, had a length of 30 feet and a height of 15 feet. See Dinosauria.

CAMPULUNG, käm′pōō-lōōng′, or Kimpolung. A town of Rumania, capital of a circle, situated on a small tributary of the Arjish. It forms the terminus of the railway line from Coleschi and had a population of 13,033 in 1899.

CAMPUS (Lat., field). In Roman times, a vacant space in or near a city, used for public shows, combats, etc. There were eight around Rome, of which the Campus Martius (Field of Mars) was the most important. It was outside the walls, occupying the level space between the Pincian, Quirinal, and Capitoline hills on the east, and the Tiber on the west. In later times this space was much reduced by private buildings, and the name was limited to the space between the river, the Circus Flaminius, and the Via lata. In this met the *Comitia Centuriata* and the *Comitia Tributa*; and in it was the public hall for the use of the magistrates and foreign ambassadors, who were not permitted to enter the city, and the *Ara Martis* (Altar of Mars). In later times it became a pleasure ground, with shaded walks, gardens, baths, theatres, and a race-course. Julius Cæsar began the change, by erecting a stone building for the voting of the people, but Agrippa did most for the place by erecting many structures, among them his baths and the original Pantheon; and Augustus added his own mausoleum and the Ara Pacis. Later emperors crowded this particular campus with public buildings and private residences. It was certainly not within the *pomerium* before the time of Hadrian, but whether it was included by him or by Aurelian is uncertain. The district in which the old Campus was situated is now called Campo Marzo. Another ancient campus was the Sceleratus, the polluted field, where vestals who had been untrue to their vows of chastity were buried alive. The open grounds around American colleges often bear the name of campus.

CAMPUS ES'QUILI'NUS. A tract of land outside of the Servian agger at Rome, once used as a burial-place for slaves and the lower classes, whose bodies were thrown into common pits. Its unsanitary condition made it a menace to the city, and the cemetery was suppressed under Augustus. Mæcenas covered the whole region with clean earth to the depth of 25 feet, and on the new-made land laid out his famous gardens.

CAMPVERE, kämp-vâr′, now called VERE, VEERE, or TER-VERE. A small fortified town of the Netherlands, situated on the eastern coast of the island of Walcheren, in the Province of Zealand, 4 miles northeast of Middelburg (Map: Netherlands, B 3). The town has fallen into decay; but its former prosperity is indicated by the town-hall of white freestone, with an elegant tower, and by the large and beautiful cathedral, which is no longer used. The town has some historical interest. It was the first to proclaim William III., Prince of Orange, General Stadtholder. The town effectually repelled the attack of the Spaniards in 1572.

CAMTOOS (kȧm-tōs′ *or* kȧm-t$\overline{\text{oo}}$s′) **RIVER.** See GAMTOOS.

CAMUCCINI, kä′m$\overline{\text{oo}}$-chē′nė, VINCENZO (1775-1844). An Italian painter, born in Rome. His first instruction was received from his brother, but afterwards he became a pupil of Corvi. He studied the works of Raphael and Domenichino; but it was the arrival in Rome of the French artist David that stimulated him to the work of painting in a classic manner subjects from Roman history. His "Romulus and Remus" and the "Death of Cæsar" were produced at this time. Among his works extant in Rome are "The Incredulity of Saint Thomas" (in mosaic at Saint Peter's), and "The Conversion of Saint Paul." Camuccini was made a member of the Institute of France, and Francis I., of Austria, bestowed on him the Order of the Iron Crown. As a man of superior taste and considerable fortune, Camuccini devoted himself to collecting pictures and objects of art, and in 1856 seventy of the pictures of his collection were purchased by the Duke of Northumberland. The "Madonna with the Pink," by Raphael, was the most important of them.

CAMUS, kå′mụ′ *or* kå′mụs′, ARMAND GASTON (1740-1894). A French politician, born in Paris. His legal ability and radical zeal brought him into prominence after 1789. He secured and published the so-called 'Red Book,' which contained a damaging record of Court extravagance. He was, as member of the Convention, the most emphatic opponent of all secret orders and ecclesiastical privileges. In 1793, while attempting to capture Dumouriez, who was charged with treason, he was himself captured. After two years and a half, the Austrians exchanged him for the daughter of Louis XVI., and on his arrival in Paris he evoked a great deal of sympathy by recounting the hardships of his confinement. The Council of Five Hundred made him a member by legislative enactment, and subsequently he became president of that body. His best service was performed when, as conservator of the national archives, he preserved from destruction the old documents of the abolished corporations and institutions. He wrote a number of valuable legal works. He died November 2, 1804.

CAM′WOOD (African *kambe*, native name for the tree + Eng. *wood*), or BARWOOD. A dyewood which yields a brilliant but not permanent red color, and is used with sulphate of iron to produce the red color in English bandanna handkerchiefs. It is the wood of *Baphia nitida*, a tree of the order Leguminosæ, a native of Angola. It is preferred to brazilwood, as producing a finer and richer red.

CANAAN, kā′nan (Heb. *Kana'an*, Gk. Χάνααν, *Chanaan*, perhaps from Heb. *kana*, to be low). According to Hebrew tradition, a son of Ham, Gen. x. 6. The curious story is told of him in Gen. ix. 22-27, that he was cursed because of a wrong done not by him, but by Ham to Noah. The latter, becoming drunk with wine, lay uncovered in his tent. Ham saw his father's nakedness, and told his brothers, Shem and Japheth, who covered their father with a garment, walking backward so that they might not see their father in an exposed state. Since it was Canaan who is cursed, and not Ham, it is claimed by many Bible critics that the story was originally told of the former, and the story itself is said to illustrate the opposition to agriculture, of which there are other traces (see article ABEL) in the Old Testament traditions, and also reflects the hostility of the Hebrews to their bitter enemies, the Canaanites. It is also claimed that in an older tradition, woven into the Pentateuch, the three sons of Noah were Shem, Japheth, and Canaan, the first representing the Hebrews, the second a people adjacent to the Hebrews (perhaps the Phœnicians), and Canaan the Canaanites. Subsequently, when the tradition became enlarged to represent all peoples known to Hebrew writers, Ham took the place of Canaan and became the general designation for nations hostile to the Hebrews. (See HAM; JAPHETH.) Canaan, in reality, is merely the eponymous ancestor of the Canaanites, and is also the common designation in the Old Testament for the land to the west of the Jordan, conquered by the Hebrews between the Thirteenth and the Eleventh centuries B.C. It should, however, be stated that the term is used rather indefinitely, and is sometimes made to include territory to the east of the Jordan, since that too was in part settled by the Hebrew clans. To the west of the Jordan the term is extended to include Philistia (e.g. Zeph. ii. 5) and Phœnicia (e.g. Isa. xxiii.), though in general it is limited to the territory actually occupied by Hebrew settlements, that is, the later kingdoms of Judah and Israel.

From the Egyptian inscriptions, in which the name Ka-n-na appears as early as B.C. 1800, it is evident that Canaan was originally applied to the Phœnician coast (including Philistia) and from the coast came to be extended to the interior. The etymology of Canaan is not certain, but it is just possible that it designated the 'low' land, since in Egyptian inscriptions the article is attached to the term, and in some Semitic languages the stem *Kana* has the sense of low. There are good reasons for believing that already at a very early period the population of Palestine represented a mixture of races. The oldest known to us are the Amorites, the Anakim, and the Rephaim. These seem to have preceded the Canaanites proper, whom the Hebrews encountered. They were powerful warriors and later tradition represents them as endowed with gigantic strength and of great stature. At the time that the Egyptian rulers began their campaigns for the possession of western Asia (B.C. 1800), the country is already well settled and the existence of numerous towns points to the presence of a civilized population, such as we find at the time of the Hebrew conquest. For several centuries Egypt remained in control, but prior to this period Babylonian influence had been dominant in the country. Whether the country was actually controlled by Babylonian or Assyrian monarchs or not, it is noteworthy that the script and language used by the governors stationed in Palestinian towns in corresponding with Egypt, as is shown by the Amarna cuneiform documents (about B.C. 1400), was the Babylonian. From the letters that passed between Egyptian officials and their royal masters we learn, among other things, that such towns as Jerusalem, Beirut, Byblos, Sidon, Simyre, etc., were already in existence, and there are also indications that in the Fifteenth Century B.C. some of the clans which afterwards were included in the confederacy of the Bene Israel were already in the land, showing, what we know from other sources, that not all of the Hebrew tribes had proceeded to Egypt. In the Fifteenth Century, however, the Egyptian control, as these Amarna tablets show, was beginning to show signs of weakness and the rise of Assyria proved a serious menace to Egyptian supremacy. The internal disturbances in Egypt were another factor which led to the loss of Palestine and Syria, so that when the Hebrew confederacy came into existence about the middle of the Thirteenth Century and the plan was formed to drive the Canaanites out of their possessions, Egypt neither offered any resistance, nor do we hear of their coming to the aid of the Canaanites. The Hebrew conquest was not accomplished at one stroke. It was a gradual displacement of the agricultural population, who were reduced to the grade of dependent serfs where they were not driven out. By the Eleventh Century the conquest may be regarded as complete and for the succeeding three centuries Israel remains in undisputed possession, though threatened at times by Egypt and involved in more or less constant warfare with the Philistines to the west, and with Moab, the Ammonites, and the Edomites to the east and south.

From the Ninth Century the Assyrian rulers pursue a more energetic policy, and as a result, the northern kingdom of Israel falls into their hands (about B.C. 722) together with the Phenician coast, while the southern portion of Canaan becomes tributary to the great power. A century later the new Babylonian Kingdom accepts the legacy of Assyria, and in 597 Canaan passes into the hands of Nebuchadnezzar II. Persia succeeds Babylonia as a world power and Canaan remains in a position of dependence. Nor is the situation improved with Alexander the Great. The Hebrews, while permitted to exercise certain authority, are under the control of the Greek satraps, and when Greece yields to Rome, Canaan, now known as Palestine from the designation Philistia, given to the southern seacoast, becomes a Roman province. From the beginning of our era to the present time, Canaan has been one of the great battle-fields of the world, on which the conflicts between the Orient and the Occident for supremacy have been waged.

See CANAANITES; CRUSADES; ARABIA; TURKEY; SYRIA; and for the geography, fauna, and flora of Canaan, the article PALESTINE.

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CANAANITES, kā′*nan*-īts. The name given in the Old Testament to the people on the west of the Jordan who were dispossessed by the invasion of the Hebrews. The use of the term is somewhat vague, and in this respect is like the indefiniteness of Canaan as a geographical designation. The Canaanites are commonly enumerated with a group of six other peoples, settled in Palestine prior to the Hebrews—viz., Jebusites, Ammonites, Girgashites, Hivites, Perizzites, and Hittites—to which, in Gen. x. 15, four more are added—Kenites, Kenizites, Kadmonites, and Rephaim—Hivites being omitted; while elsewhere the Girgashites and Hivites are omitted. The grouping is not scientific. The Ammonites represent, apparently, an older settlement than the Canaanites; the Hittites have no connection with Canaanites; while Jebusites and Girgashites are local or territorial designations, forming subdivisions of the Canaanites rather than independent groups: and this may be true, likewise, of the Perizzites. A late tradition (II. Es. i. 21) is probably nearer to the ethnic facts in separating the pre-Israelitish inhabitants of Palestine proper into Canaanites and Perizzites. As to the relationship between the Perizzites and Canaanites we know nothing, though they were probably closely akin. The Canaanites, whose name becomes the general designation for the agricultural population whom the Hebrews found in Palestine, are well known through the accounts which the Hebrew writers furnish. They lived in a state of comparatively advanced culture. As an agricultural people they were rather a peaceful nation, who, however, showed great powers of resistance in opposing the advance of the Hebrews, being better equipped and able to protect themselves in their walled towns. Their religion was precisely of the kind that we would expect among an agricultural people. There was no centralized cult. Each locality had its deity, known as a 'Baal' (i.e. lord), to whom the ground was supposed to belong (see BAAL), and upon whose favor the fertility of the soil depended. Altars were erected to the baals, usually on prominent places or in groves. The pole, representing a tree and symbolizing fertility, stood by the altar, on which the first fruits were piled and conciliatory presents offered in days of distress, or when a failure of the crops was threatened. The festivals were, likewise, of an agricultural character, the three chief festival seasons being in the spring, early summer, and autumn. They were occasions of merry-making, and the scenes, particularly of the harvest festival, were of a hilarious character, culminating no doubt at times in riot, and perhaps were somewhat licentious. Many of the religious customs of the Canaanites were taken up by the Hebrews upon their taking possession of the country. The invasion marked the change from a seminomadic to an agricultural life for the latter, and they naturally looked to the baalim for protection and blessings of the soil. This amalgamation of Canaanitish worship with the Jehovistic rites evoked the opposition of the ardent Jehovah worshipers, represented by Elijah and Elisha, in the Ninth Century B.C., and by the Hebrew prophets (Amos, Hosea, Micah, etc.) in the Eighth Century, which led finally to the abolition of the old Canaanitish sanctuaries and the recognition of the temple at Jerusalem as the only legitimate seat of Jehovah worship. The language of the Canaanites, identical practically with the Phœnician (q.v.), was adopted by the Hebrews upon their taking possession of the country. Canaanitish and Hebrew, therefore, as ordinarily understood, are synonymous terms. Among recent anthropologists, Sayce (1888) and Brinton (1890) consider the Canaanites a pre-Semitic white race (Canaanites, Phœnicians, Amorites, etc.) of North African (Libyan) stock, and Sergi (1901) is of similar opinion. Others, looking upon 'Amorites' and 'Canaanites' as somewhat synonymous (as Brinton, in 1895, was inclined to do), ally them with the Semites. Keane (1896) uses Canaanites to designate a group of kindred Semitic peoples, which includes "Hebrews, Phœnicians, Carthaginians, and others." The real Canaanites were probably a people of mixed Semitic and Aryan (possibly, also, Hamitic) blood.

CANA-BOTA, kä'nȧ-bō̅'tȧ. A very large shark (*Hexanchus griseus*), inhabiting deep waters off the coast of Europe, and in the Mediterranean, and wandering to the West Indies. See Shark, and Plate of Lampreys and Dogfish.

CANACE, kăn'ȧ-sē (Lat., Gk. Κανάκη, *Kanakē*). The offspring of Æolus and Enarete, in Greek mythology, who conceived an incestuous passion for her brother, Macareus, and was punished for it by death. Gower mentions her in the *Confessio Amantis*, and Chaucer in the *Man of Law's Tale*. She is not, however, to be confused with the Canace in the latter author's *Squire's Tale*, who is the daughter of King Cambuscan, and who, owing to the possession of a magic ring, can understand the love plaint of a female hawk.

CAN'ADA (probably from Iroquois *kanada*, cabin), Dominion of. A country occupying the whole of the Continent of North America north of the United States, except Alaska. (See special map, accompanying this article.) The continental portion is about 2700 miles in greatest length, from the Atlantic to the Pacific, and measures about 1600 miles from north to south, which gives to it, with the outlying 'lands' and islands, an area exceeding the United States with Alaska, and nearly equal to that of all Europe; somewhat more than one-sixth of this is under water. Excluding unsurveyed Arctic islands, its gross area approximates 3,500,000 square miles, the land surface of which is distributed among the component political divisions (largely by computation) as follows:

	Square Miles
Prince Edward Island	2,000
Nova Scotia	20,550
New Brunswick	28,100
Quebec	344,459
Ontario	219,650
Manitoba	64,066
Assiniboia	89,340
British Columbia	382,300
Saskatchewan	108,000
Alberta	99,255
Athabasca	239,500
Keewatin	498,000
Yukon	196,300
Mackenzie	481,200
Ungava	276,000
Total	3,048,711

No official statement of area is as yet given for the unorganized territory of Franklin, which comprises the Arctic archipelago. The most northerly point of the domain is probably Cape Columbia, in Grant Land. The most westerly boundary is formed by the 141st meridian of west longitude.

Topography. The physiography of Canada falls broadly into three great divisions, distinguished by fundamental differences in geological structure, surface, and climate, namely: I. The hilly, diversified eastern half. II. The elevated interior plains, comparatively level, and largely treeless, sloping gently northeast and north. III. The mountain region, between the plains and the Pacific Coast, or the Alaskan region, which consists of the northern extension of the Rocky Mountains of the United States, their included plateaus, and of various coast ranges. Each of these prime features of the continental topography is divisible into certain large, natural subdivisions, which conform in the main to the drainage basins, determined by the events of geological history.

1. The eastern part of Canada has a broken or hilly surface of generally low elevation. The highest points of the coast of Labrador approach 8000 feet, but the interior of northern Quebec and of Labrador, or of the region west of Hudson Bay, does not exceed 1500 to 3000 feet, and slopes steadily to the level of the shores of Hudson Bay. This whole vast region, embracing the land from the lower Saint Lawrence to Hudson Bay, and continuing in a broad margin around it, is a succession of low, often bare or thinly forested ridges of hard rocks, between which are innumerable lakes, swamps ('muskegs'), and torrential rivers. Its recent release from universal glaciation, and the unfavorable climate, have not permitted much valuable soil to accumulate, except in small, isolated areas, and the region is not adapted to any considerable human habitation. Many large rivers flow into Hudson Bay from the east; some shorter, but copious ones, from the south, of which the Moos and Abitibbi form canoe routes to James Bay; while the Albany River forms a canoe route from the Lake of the Woods region to the same inlet. In the west the drainage into Hudson Bay includes the whole basin of the Red, Saskatchewan, Churchill, and other rivers, thus embracing the southern half of the interior plains area; but this will be spoken of later. The Hudson Bay basin is defined south and southeast by a scarcely perceptible watershed, called 'the height of land,' or, along the northern boundary of the Province of Quebec, where

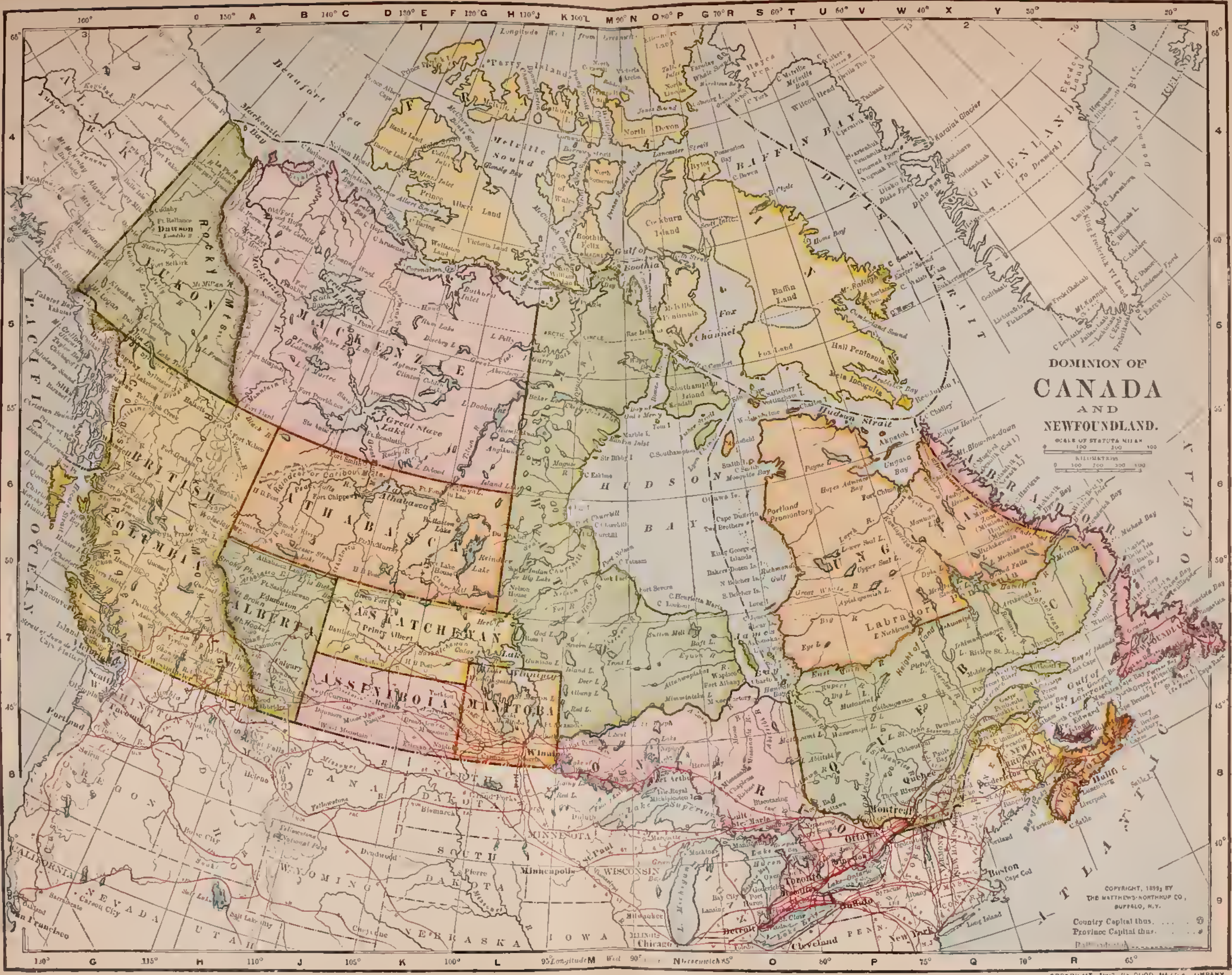
it is better defined the 'Laurentian Hills,' which divides the heads of the streams flowing northward from those draining southward into the Saint Lawrence. This very ancient river valley, which includes the whole system of the Great Lakes (partly within the United States), is over 2000 miles long, and forms the drainage outlet for an area of about 500,000 square miles. The surface of the Saint Lawrence Valley is broken in places by intrusive igneous rocks, which remain standing above the surface in such abrupt heights as Mount Royal, at Montreal, and the picturesque *buttes* south of that city. Another topographic feature in this region is the Niagara Escarpment, the eastern edge of a plateau over the brink of which the waters of Lake Erie are poured into Niagara Falls (q.v.). As the escarpment is traced northward, it becomes more lofty, rising into high, rocky hills, which form the backbone of the triangular, very picturesque extension of land separating Lake Huron from Georgian Bay. The valley of the Saint Lawrence narrows toward its mouth, where the northeastern extension of the Appalachians forms the mountainous Gaspé Peninsula and also the islands of Anticosti and Newfoundland. South of this lies the distinct region of the Maritime Provinces, whose features are largely similar to those of New England. See NEW BRUNSWICK; NOVA SCOTIA; PRINCE EDWARD ISLAND.

II. The second great division of Canada—the Interior Plains—comprises the area, some 700 miles in breadth, which continues the plains of the United States northward to the shores of the Arctic Sea, between Hudson Bay and the Rocky Mountains. This region is, however, more broken, well watered, and has more forest than the high, open plateaus southward, and is lower, constantly diminishing in altitude northward, the international boundary (latitude 49° N.) nearly coinciding with the watershed between the drainage into the Gulf of Mexico and that into Hudson Bay. Referring to this Canadian plains region, George M. Dawson, chief of the Geological Survey of Canada, wrote:

"The whole interior region of the continent slopes gradually eastward from the elevated plains lying near the base of the Rocky Mountains to the foot of the Laurentian Highlands, and, though the inclination is more abrupt in approaching the mountains, it is not so much so as to attract special attention. Between the fifty-fourth and forty-ninth degrees of latitude, however, along the lines which are in a general way parallel and hold a northwest and southeast course across the plains, very remarkable step-like rises occur. These escarpments form the eastern boundaries of the two higher prairie plateaus, and the most eastern of them overlooks the lowest prairie level, or that of the Red River Valley. The three prairie steppes thus outlined differ much in age and character, and have been impressed on the soft formations of the plains by the action of subaërial denudation of former great lakes and probably also of the sea. . . . The actual increase of elevation accounted for in the two escarpments, however, is slight compared with that due to the uniform eastward slope of the plains. The direction of greatest inclination is toward the northeast, and a line drawn from the intersection of the forty-ninth parallel and the mountains to a point on the first prairie level north of Lake Winnipeg will be found to cross the escarpments nearly at right angles, and to have an average slope of 5.38 feet to the mile. From the same initial point, in a due east line to the lowest part of the valley of the Red River, a distance of 750 miles, the plains have an average slope of 4.48 feet per mile. . . . Northwest of the North Saskatchewan no extensive treeless plains occur in the central region of the continent, and the forest country of the east forms a wide, unbroken connection with that of the northern portion of British Columbia."

Along the edge of the lowest or easternmost of these levels lies that series of great lakes—Manitoba, Winnipeg, Winnipegoosis, Reindeer, La Hache, and many other lesser ones—which form so striking a feature on the map, and empty by large, rapid rivers into Hudson Bay. Down from lakes on the second level flow such large rivers as the English or Churchill, Ice and Dobaunt, the Ice carrying to Hudson Bay some overflow from Lake Athabasca; while from the foot of the Rocky Mountains, and gathering the drainage of all three plains levels, comes the great Saskatchewan, in two branches, the North and the South, to enter Lake Winnipeg (which also receives from the south the large Red-Assiniboine affluent), and thence to flow through Nelson River to Hudson Bay. North of the North Saskatchewan, on about the 55th parallel of north latitude, a line of rocky and forested highlands forms a watershed between its valley and that of the outflow toward the north. This begins with the great Athabasca and Peace rivers, which pass eastward from the base of the Rockies through a rough region to Athabasca Lake, and thence enlarged (as the Slave River) to Great Slave Lake, which also receives the powerful Liard from the west. This lake narrows westwardly into the Mackenzie, which flows northwestward to the Arctic Ocean, about 120 miles east of the border of Alaska. This great river is the equal of the Missouri in length, but discharges more water than does that stream, and is comparable to the mighty watercourses of Siberia. Its course lies near the base of the Rocky Mountains, west of which lie the head streams of the Yukon (q.v.), all of which are within Canadian territory. East of the Mackenzie, half way between Great Slave Lake and the Arctic Coast, lies the extensive Great Bear Lake, a feeder for the Mackenzie. Here the country is low, and a part of this lake's waters escapes into Coronation Bay by way of the Coppermine River. East of the head of the Coppermine a low divide turns the waters east of it into the Great Fish or Back River, which flows through the desolate wastes, called the Barren Grounds, that lie between Hudson Bay and the Arctic Ocean (Victoria Strait), and empties into the latter at Elliot Bay. Of all these rivers, the greatest is the Mackenzie, but the most important are the Saskatchewan and the Red, for they have made available a wide area of habitable and valuable land. The Saskatchewan collects most of the waters of the three districts, Alberta, Assiniboine, and Saskatchewan, by the two main channels, each some 300 miles in length, and then flows 200 miles more to Lake Winnipeg. This lake also receives, besides the Red River and its tributary, the Assiniboine (which drain all southern Manitoba and much of North Dakota and

DOMINION OF CANADA AND NEWFOUNDLAND.



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Minnesota), the Winnipeg River, and the lakes Manitoba, Dauphin, and Winnipegoosis, which, together, equal or exceed the bulk of Lake Erie. Lake Winnipeg itself is nearly as spacious as Lake Huron, and pours its waters through the great Nelson River, a series of rapids descending to Hudson Bay. The Saskatchewan and Red rivers were the former avenues of travel, and their valleys are now the seat of the principal population and industry in the Northwest.

III. The mountainous western border of Canada consists of a belt of snowy ranges from 500 to 600 miles in width. On the east are the Rocky Mountains, continuous with those of Montana, which consist of gigantic uplifts and foldings of the strata. Hence the scenery presents series of vast bedded cliffs, and weather-worn, jagged summits, instead of the rounded domes and slopes familiar in the southern Rockies. The ranges run northwest in approximately parallel lines, which are capped with snow and glaciers. This is due to their high latitude rather than to altitude, since there are but few peaks that exceed 11,000 feet, except between latitudes 52° and 53°, where a number of peaks have recently been described whose elevations appear to exceed 13,000 and 14,000 feet. Mounts Columbia, Forbes, Bryce, Alberta, and Freshfield are seemingly the highest of these. A somewhat distinctive range west of the first is the Selkirk, in which are the headwaters of the Columbia River, and which carries the Great or Illecillewaet glacier. Then comes the Gold or Columbia Range, while farther west lies a broad, elevated plateau valley, drained by the Thompson and Fraser rivers, and forming the centre of British Columbia. Between this valley and the Pacific Coast extends a belt of intricate coast ranges, which northward form the boundary mountains between Canada and Alaska, and whose outermost summits constitute the line of islands—Vancouver, Queen Charlotte, and the Alexander Archipelago — which characterize that coast. (See BRITISH COLUMBIA and ALASKA.) It is through these coast ranges that the Fraser River (about equal to the Ohio) cuts its way in a series of magnificent cañons. These orographic features have had a very important bearing on both the climate and the economic value of this part of the country.

CLIMATE AND SOIL. The difficulty which meets one at the outset who attempts a brief generalization of Canada in any of its broader aspects is well stated by one of the latest essayists in this direction. "To characterize in a few lines," he remarks, "a country covering more than half the continent of North America, and reaching from the latitude of Constantinople to the North Pole: a country whose circuitous coast line on the Atlantic measures 10,000 miles, and whose western shore upon the Pacific, studded with islands and indented by secure harbors and deep inlets, attains almost an equal length; a country where maize and peaches are staple crops, and where vegetation fades out upon the desolate and melancholy shores of the Arctic Ocean—to characterize such a country by a few general phrases is evidently impossible. If we look at the eastern portion alone, we see the greatest forest region in the world. If we consider the central portion, we are regarding the great prairie country: but if we cross the passes into the Pacific Province, we enter upon that 'sea of mountains' compared with which the most mountainous country in Europe is of limited extent." In the northeastern region, the 'Hudson Bay Country,' the characteristics are Arctic or sub-Arctic—a brief, warm summer and a long, cold winter, with much fog at all seasons on the ice-bound coast. The current of cold water flowing down that coast past Greenland keeps the entrance to Hudson Bay frozen nearly two-thirds of the year, and often packs ice along the coast of Labrador so persistently as to make it inaccessible until midsummer; while the region of the Gulf of Newfoundland abounds in fog, and the air of New Brunswick and Nova Scotia is surprisingly cool, with much rain and snow. In the northern interior dry and severe cold prevails over half of the year, the mercury, even as far south as Manitoba, frequently dropping to 50 degrees below zero of the Fahrenheit scale. The climate of the Saint Lawrence Valley, however, is excellent—cold, dry, and bracing, with much snow and occasional severe cold in winter, and in summer heat without much moisture, but usually an abundance of rain for crops, which are also nourished by the moisture given to the ground by the plentiful snow. In the Maritime Provinces the neighborhood of the ocean modifies the extremes both of winter cold and summer heat, but causes more rain and fog. As for soil, north of the Laurentian Hills, and through the Hudson Bay and Labrador regions, it is scanty, and little except garden vegetables can be grown, because of the liability to summer frosts. In the valley of the Saint Lawrence, however, a belt of alluvial lowland near the river is extremely fertile; and the whole of southern Ontario, by reason of its moderate climate and varied soils, largely the result of glacial deposits, is exceedingly well adapted to agriculture in all its phases, and to the raising of all the hardier fruits. The grain crops and apples of Ontario are famous. There is little space among the rocky hills of northern Ontario for agriculture, and the winters are rather too severe north and west of Lake Superior; but when the plains of Manitoba are reached, highly favorable conditions for agriculture are again encountered. The soil of the Red River Valley, including the valleys of the Assiniboine and Souris (Mouse), is a deep black prairie loam of the highest fertility. The same may be said of the whole plains region, even on the high western steppes, where only water is needed to insure great productivity, and of all the valleys of British Columbia and its coast.

The climate of the more southerly, habitable part of the Canadian Northwest is much more favorable to life than one would suppose from a knowledge of its latitude merely. The isotherm of 65° F. mean summer heat, which is that of the St. Lawrence Valley at Quebec, curves northward along the south shore of Lake Superior and through Manitoba and Assiniboia to northern Alberta. This increase of warmth westward and northward, as the mountains are approached, is due to the effect of the mountains upon the prevailing air-currents. There, as elsewhere, the usual winds blow from the west, and come to the coast expanded and saturated with warmth and moisture, after flowing for thousands of miles across the Pacific, whose waters are twenty degrees warmer than are those of the North Atlantic. Vancouver Island and the coast of British Columbia have a climate, in consequence, much like that of the south of England, but warmer, and even more moist. Flowers bloom in the gardens the year round, and fruit reaches the utmost excellence. Warmth and rainfall are derived from the latent heat, and absorb moisture set free by condensation of the oceanic air against the high and cold Coast Range. Robbed of only a portion of their burden, but lifted and rarefied by elevation, the winds sweep across the interior valley of British Columbia and strike against the snowy Rockies, to deposit more rain or snow, but rain so rarely falls on the intervening Fraser-Thompson Valley that agriculture there must depend upon irrigation. The reason for this is that the ever-ascending heat of the sun-baked plains buoys up the higher air-currents and lifts them straight across to the Selkirks and Eastern Rockies, to whose vast snow-fields they give almost all of the moisture yet remaining. These once warm winds are now, however, cool winds, because they have become dry and rarefied. The eastern side of the Canadian Rocky Mountains has little snow, and is sparsely provided with trees, as compared with its western side, or with the coast ranges, and the general temperature is cooler; yet the eastern foothills of the Rockies have a milder climate and earlier spring than the western, or than is enjoyed by Manitoba. This is due to the phenomenon called the Chinook, which is a wind caused by the rarefied air rushing down from the summits, necessarily increasing in density by compression as it strikes the plains level, absorbing moisture and giving up its latent heat to the extent of about 23° F. The chinook is not a wind that has come warm from the Pacific, but is of local origin. In summer the same breeze seems cool in comparison with the fierce radiation of the baked plains, but it is equally a chinook. (See CHINOOK WIND.) The genial influence of this warm, dry wind is seen in winter in the quick evaporation of the snow, and the consequent exposure of pasturage to stock, and in producing early conditions of spring. On Peace River the winters are milder than those of Manitoba or Ontario, and everything that will grow near Toronto will ripen at Dunregan, 13 degrees of latitude north of it—the same latitude as the middle of Labrador! Its influence wanes with distance eastward, however, and Manitoba is subject to the extremes of its position at a high latitude in the centre of a continent, being subject to excessive noonday heats in summer and excessive cold in winter, with the nights always cool, and the autumnal frosts liable to begin in August. In the extreme north a rigorous Arctic climate prevails, with the winter temperature descending to —75°. The summers are, however, still favorable to plant growth. The whole Northwest, however, is healthful in a high degree.

FLORA. The flora of all the northern part of Canada is Arctic and sub-Arctic, and this characterizes the scanty growth in the eastern part all the way down to the height of land which separates Labrador and the basin of Hudson Bay from the Saint Lawrence Valley. A great space between Hudson Bay and the Arctic shores is almost a desert, and has been known from the earliest times as the Barren Ground or Tundra, yielding hardly anything more than mosses, lichens, and a few willows and hardy herbs. The flora of the Saint Lawrence Valley and of the Maritime Provinces differs little from that of the northeastern United States, the whole of that space having been originally covered with mixed forests of large and valuable trees, both coniferous and hard wood. The western plains are comparatively treeless as far north as the Saskatchewan, yet are covered with prairie grasses and herbage, which thin out toward the higher and drier steppes westward, where the plains are covered with the bunch-grasses which once supported enormous herds of buffaloes and antelopes, and now furnish sustenance for a rich stock-raising region. North of the Saskatchewan a broad belt of rather small and sparse trees extends from Hudson Bay to Great Slave Lake and the Rocky Mountains—chiefly spruce, tamarack, and poplar. The dry western slopes and valleys of the Rocky Mountains are thinly covered with woods, mainly pine; but the forest increases in density and the trees in size as one proceeds west toward the region of greater rainfall; and after passing the treeless Fraser Thompson Valley, the coast ranges, and especially their western slopes, are found covered with the dense forests of mighty evergreen trees that characterize the northwest coast of all North America. The principal trees are the Douglas spruce, or 'Oregon pine' (*Pseudotsuga*); the white cedar (*Thuja*); a hemlock (*Tsuga Mertensia*), and Englemann's spruce (*Picea Englemanni*). These coast forests are inconceivably dense and sombre, and their average height on the lowlands is not less than 200 feet, while the Douglas spruces often exceed 300 feet, and the cedars are hardly less tall.

FAUNA. The animals of Canada are as varied as its flora and characteristic of northern latitudes. All bear a close resemblance to those of Northern Europe and Asia, and many species are identical—that is, have a circumpolar range. (See AMERICA, paragraph on *Fauna*.) The carnivora are represented by several species of the weasel family (such as the ermine, sable, fisher, wolverine, mink (qq.v.), etc., whose abundance and value long ago gave the name Fur Countries to northern Canada. There are also the lynx, bear, fox, wolf, skunk, and in the Northwest the badger. The puma or American lion is still found in some parts. Among the rodents, the beaver is so widespread and characteristic, and was so important to the beginnings of colonial civilization, that it has become the national emblem of the Dominion. The Canadian porcupine, muskrat (locally called 'musquash'), hares, and many smaller rodents are numerous, and on the western plains are a variety of burrowing 'gophers' and the like. The Virginian and black-tailed deer enter the southern edge of Canada, and the elk is found in the Rocky Mountains, but the moose and various caribou range all over British North America; and in the mountains of British Columbia the wild sheep and the white goat antelope are numerous and highly characteristic. The prong-horn antelope is still abundant in some parts of the Saskatchewan Valley, and the musk-ox is found in the Arctic tracts. There is an immense variety of birds, many of which, characteristic of northern climates, are unknown southward; but the majority are migrants that go to the northern parts of Canada to breed, and leave the country in the winter for warmer regions southward. Fishes are numerous in all the inland waters, and about all the coasts (see *Fisheries*, below), but reptiles and the more delicate insects are scarce, except in the most southerly part. The gathering of furs, which played so striking a part in the colonization and earlier prosperity of the country, has been greatly diminished of late, owing to the extinction of the principal fur-bearing animals over a large part of their former range. The beaver, in particular, has disappeared from all but the remotest and wildest regions. In 1900 the exports of furs amounted to $1,800,000, besides which there was a valuable quota of skins other than furs. The game animals are hunted by large numbers of sportsmen, and, in spite of protective laws, the supply of game is diminishing.

Geology. While the geological structure of Canada exhibits a variety of detail that is commensurate with the vast area and diversified surface of the country, in a broad aspect it is simple and can be easily explained. The most ancient rocks found in Canada, and in North America as well, are the granites, gneisses, and schists which underlie a great V-shaped area, having Hudson Bay in the centre, and extending from the Great Lakes northeast to the Labrador coast, and northwest to the shores of the Arctic Sea. This area was once diversified by mountains, which are represented at the present time, after an immeasurably long period of erosion, by the Laurentian plateau. The age of the granites and banded rocks is Archæan. On the borders of this primitive land area stratified beds have been deposited during all the succeeding geological periods. The Cambrian and Silurian systems are represented by great thicknesses of strata that outcrop in Nova Scotia, New Brunswick, Newfoundland, along the Saint Lawrence Valley, and on the shores of Lake Ontario. They also appear farther west in Manitoba, extending thence in a northwesterly direction toward the Arctic regions, and into British Columbia. The Devonian System is less extensively developed in the eastern provinces, but it constitutes a wide belt in the prairie regions which border the Cambrian and Silurian strata. Between this Devonian belt and the Eastern Rocky Mountains the surface is formed by Cretaceous and Tertiary beds that are a part of the great series reaching northward from Texas across the United States. The Rocky Mountains of Canada are similar in structure to the mountains of Colorado, Wyoming, and Montana, and have been built up by upheaval and folding of sediments, and, to a lesser extent, by volcanic action. The strata of which they are composed range in age from Paleozoic to Tertiary, while in the Selkirks even the Archæan may be present. The Carboniferous System is not especially important in respect to area, but it contains the valuable coal deposits of Nova Scotia and New Brunswick, and is known to occur also in the central prairie region, in British Columbia, and along the Arctic coast. The coal beds of Vancouver Island and those found in the Rocky Mountains are of Cretaceous and Tertiary age. In recent geological times nearly the entire area of Canada was covered by an ice sheet, the Laurentian glacier, that terminated in the northern United States. The surface features were profoundly modified by the erosive action of this vast mass of moving ice, as is evidenced by the numerous great lakes, and by the extensive deposits of sands, gravels, and clays that rest upon the older geological formations. See also *Geology*, under British Columbia; Ontario; etc.

Mineral Resources and Mining. Canada was long supposed to possess great mineral wealth, but only in recent years has the great variety, extent, and richness of its mineral resources been ascertained. The geological provinces which have been so productive of mineral wealth in the United States, viz. the Appalachians in the east, the Cordilleras in the west, and the Lake Superior region between the two, extend northward into Canada. A combination of adverse circumstances, however, has prevented the extensive development of the mining industry; among these are the sparse population, its dispersion over a very wide area, the isolation of the mining lands, and the lack of means of transportation. In addition to this is the severity of the climate. Moreover, the coal-supply, so necessary in the smelting of metallic ores, while present in enormous deposits, is located at the two extremes of the country (Nova Scotia and British Columbia), leaving the middle region at a great disadvantage. That these disadvantages will not permanently check the development of the industry, however, has been clearly demonstrated by its recent growth. During the last decade of the last century the value of the total mineral product increased from $18,700,000 to $63,775,000, most markedly in the case of gold.

Gold has long been mined in moderate quantities in Nova Scotia, where it is found in the quartzites and slates of the Cambrian rocks, but larger quantities were secured from the placer mines of British Columbia, in which work began about 1857, and whose output by 1863 had reached an annual value of over $4,000,000, but subsequently declined until in 1890 it was less than $1,000,000. The great revival of the industry came in 1897, when the placer mines of the Klondike and other Yukon regions were opened, the output of the Yukon district alone reaching the phenomenal figure of $22,000,000 (estimated) in 1900. (See Yukon Gold-Field.) Quartz and hydraulic mining has lately been undertaken in southern British Columbia (the Kootenay region) with a consequent decided increase in the output of that section. Gold exists at other points, notably on the north shore of Lake Superior, but mining operations there are still on a small scale.

Another decided increase is that of *coal*, which ranks next to gold in value of output, which latter about doubled during the last decade, being $12,668,000 in 1900. Of this, Nova Scotia produced about three-fifths and British Columbia the greater part of the remainder, the main production in the latter province being on Vancouver Island. Most of the coal of British Columbia and Nova Scotia is bituminous, of good quality, while the vast fields of the interior plain, extending from southwestern Manitoba westward to the mountains contain rich deposits of serviceable lignite, and anthracite is found on Queen Charlotte's Island and near Calgary, Alberta. Altogether the coal-fields cover 97,000 square miles, not including certain undeveloped areas in the far north.

The *copper* product increased in value during the decade from less than one to more than three million dollars, most of it being mined in British Columbia and Ontario, and smaller quantities in

Quebec. In British Columbia it is found in combination with gold and silver, and is mined chiefly as a by-product. None of the Canadian copper ore is refined in Canada, but the ore is shipped into the United States for that purpose.

Silver and *lead* have likewise increased greatly, the latter from almost nothing, the former from a few hundred thousand dollars annually to about $2,700,000 each in 1900. British Columbia produces the greater portion of these, the two metals being united in the same ore, which is found in the clay schists and intrusive granites occurring in the Kootenay region.

Canada holds a position of special advantage in the production of two minerals, *nickel* and *asbestos*, having excelled her only rival (New Caledonia) in the production of the former, and having the field almost wholly to herself in the production of the latter. The nickel is mined in the Sudbury district, northeast of Lake Huron, where mining began in 1888, and in 1891 the output amounted to $2,700,000, after which it decreased somewhat until 1900, when it rose to $3,227,000. The asbestos is mined in the eastern townships of Quebec, where it is found in veins which run through rocks of massive serpentine; the annual output averages about $500,000.

Iron is perhaps the most widely distributed mineral, being found in every province, but its utilization has suffered from the lack of coal for smelting purposes, and from the prohibitive tariffs of the United States. The Dominion Government and also the Government of Ontario have placed a bounty upon pig iron, which has stimulated its production, the value of the product exceeding $500,000 in 1900. The prospects for the development of iron-mining are greatest in Nova Scotia, inasmuch as coal and limestone are there found in close proximity to the iron ore.

The production of *petroleum* and of *salt* in the peninsular part of Ontario has long constituted well-established industries; the annual value of petroleum products exceeds $1,000,000. Natural gas is also found in this region.

Among the less important minerals are gypsum, graphite, pyrites, and mica. The output of lime averages $700,000 per annum, and the production of cement is rapidly approaching that amount. There are enormous resources in the way of building-stone and clays, which are extensively drawn upon. While the future holds in prospect an increasingly rapid exploitation of Canadian minerals, the supply is so great that the question of their final exhaustion scarcely presents itself, and the inhospitable Laurentian regions to the north will contain untouched hoards of wealth for centuries to come.

FISHERIES. With oceans washing its shores on three sides, the Great Lakes and numerous small lakes and rivers scattered throughout its domain, Canada has exceptional advantages for the development of the fishing industry. Naturally, this was developed early, and in at least three of the four Maritime Provinces it has long ranked next to agriculture in importance. Later fishing became prominent in the lake waters adjoining Ontario, and still more recently in British Columbia and on Lake Winnipeg. The total value of the fish product has increased from $6,577,000 in 1870 to $17,000,000 in 1890, and $21,800,000 in 1899. The recent gain has been almost wholly in the West. Nova Scotia far outranks the other provinces, her yield having stood at about $7,000,000 for a decade and a half. During the same period the yield of New Brunswick has fluctuated at about $4,000,000. Ontario and Quebec have each stood a little under the $2,000,000 mark. Prince Edward Island has fluctuated at about $1,000,000, but British Columbia has increased during the decade ending in 1899 from $15,000 to $5,000,000, and Manitoba has increased from almost nothing to $1,000,000, having fallen considerably below that amount, however, for the last few years.

The total number of fishermen is slowly increasing, having been 63,700 in 1890 and 79,800 in 1900. Of the latter number 70,800 represented boat fishermen, and 8900 vessel fishermen. Besides these, 18,700 persons were employed in the lobster canneries. The Dominion Government since 1882 has paid a bounty for deep-sea fisheries, which at present amounts to $160,000 annually, about two-thirds of which is taken by the Nova Scotia fishermen. In 1899, 27,100 men shared the bounty.

Of the east coast fisheries, cod and lobster are the most important, each annually exceeding $3,000,000 in value; the herring fisheries exceed $2,000,000; and of a large variety of other kinds of fish the most important are mackerel, smelts, sardines, haddock, and hake. In the Great Lakes trout is the most important, followed by pickerel and pike. Whitefish leads in the lakes of Manitoba, and on the Pacific Coast salmon is of greatest consequence. The sea-otter and seal fisheries of the west are also important, though much less so than in former years. Thirty-five thousand five hundred sealskins (valued at $440,000) were taken in 1900, of which 16,430 were from the coast waters of British Columbia and 17,500 from the Bering Sea. From 1871 to 1900 the sealskins taken by the Canadian pelagic sealing numbered 737,048. The best whale-fishing region in the world extends along the north coast, from the mouth of the Mackenzie to Labrador, and vessels from many nations visit it annually. The fishing industry is wisely guarded by the Government, the Minister of Marine and Fisheries being charged with its oversight. Artificial pisciculture is carried on in fourteen hatcheries.

AGRICULTURE. Dating from the earliest permanent settlement, agriculture has stood preëminent among the Canadian industries, and 45 per cent. of the population secures its livelihood directly from the soil. The fertile lands of the Maritime and Saint Lawrence provinces were early brought under cultivation. On the other hand, the vast productive plains of the far West, owing to their isolation and their real and supposed inclemencies of climate, have only recently been utilized. A large portion of the fertile lands of southern Manitoba were taken up at the close of the Nineteenth Century and the occupation and cultivation of the region farther west progresses as it is made accessible by the construction of railroads. The practicability of agriculture in this section has been clearly demonstrated, the climatic conditions not being so unfavorable as they were formerly represented. It is only in the northern portions of the plains that the growing crop is greatly endangered by summer frosts. And, though the rainfall is scant, it occurs during the growing spring months, and it is generally adequate for the needs of the crops. The driest portion of the plain is on the western border, but much of this is irrigable and even in its natural state is well adapted to grazing. The Government exercises a close supervision over irrigation, and there are 525 miles of ditches and canals. From the Great Lakes eastward to the Atlantic the agricultural area is limited only by surface conditions, the climate being very favorable. There is in this area much hilly and broken territory which does not lend itself readily to profitable cultivation. But throughout northern Canada, including the greater portion of the Laurentian region, the climatic conditions will never admit of agricultural development. See *Climate*.

The districts in which agriculture has developed most are Prince Edward Island, the protected valleys of the Annapolis in Nova Scotia and the Saint John in New Brunswick, the narrow valley of the Saint Lawrence above Quebec City, peninsular Ontario, and the Red River Valley in Manitoba.

Ontario far exceeds any other province in agricultural importance—indeed, it is equal to all the others combined. Especially remarkable is the extensive cultivation of oats, the acreage being about 2,400,000. In barley and peas, particularly the latter, it also greatly outranks the other provinces, each crop having considerably over 500,000 acres devoted to its cultivation. Its acreage (1,400,000) and yield of wheat is almost as great as that of the more famous fields of Manitoba, and it is practically the only province of the Dominion in which corn is raised. Much attention is given to the raising of hay in Ontario and all the eastern provinces, large quantities of which formerly used to be shipped into the United States, particularly from the eastern townships of Quebec.

The Maritime Provinces, excepting Prince Edward Island, have never entered so extensively into agricultural pursuits, but have become well known for the production of certain crops. Potatoes and turnips receive great attention, and the yield and quality of the product are remarkable. The same is true of the apple crop of the Annapolis Valley in Nova Scotia, and, to a less degree, of the Saint John Valley, New Brunswick. The annual shipments of apples from these provinces together with those from Ontario and Quebec are enormous. The Lake Erie coast of Ontario has become noted for its grapes. It has been found that larger fruits do not thrive well on the western plains, but throughout the whole of southern Canada and well to the northward, various kinds of smaller fruits, particularly berries, thrive abundantly. British Columbia, though not possessed of such large tracts of arable land as the other provinces, can still boast of its greater adaptability for fruit-raising, and the production of hops is being extensively engaged in.

On many farms throughout agricultural Canada, particularly in Manitoba, wheat formerly constituted almost the only crop, but more recently there has been a growing tendency toward mixed farming and the raising of cattle and other stock. Canadian stock has a wide reputation for the purity of its breeds, and great care is taken to prevent deterioration. The raising of beef for the English market has long been an important source of revenue. Probably no phase of agricultural development in the East is so remarkable, however, as the dairy industry. In Ontario alone the creameries increased from 74 in 1893, to 323 in 1899, and during the same period the cheese factories increased from 897 to 1203. In all the eastern provinces poultry-raising is attended to, and the exportation of eggs is very large. In the absence of other recent statistics covering the whole of Canada, the export figures are the fairest available test of agricultural development. The total exports of the domestic agricultural products increased from $19,341,000 in 1868, to $81,000,000 in 1900. Wheat and flour had not increased very materially until the last three years of that period, when it averaged over $18,000,000, considerably more than twice the average for former years. Oats has averaged a little less than $3,000,000 for the last three years mentioned, which is also over twice the average for former years. Barley, on the contrary, shows a decided falling off, while peas continue to fluctuate about $2,000,000. Butter, while showing great fluctuations, reached its high-water mark in 1900, when it exceeded a value of $5,000,000. Cheese, however, shows a constant increase, having been $548,000 in value in 1868, $9,000,000 in 1890, and $19,000,000 in 1900. Cattle shipments increased rapidly until 1891 and more slowly since that period, the value amounting to $9,000,000 in 1900. The exports of sheep for two decades have fluctuated at about $1,500,000 in value. The exportation of horses, whose value averaged about $2,000,000 for the decade ending with 1890, averaged about $500,000 less for the succeeding decade, but subsequently increased, due to the demand for the war in South Africa.

The Dominion Government has established a central experimental farm at Ottawa, and four branch farms in more remote parts of the Dominion. The several provinces have encouraged agriculture by grants to societies and fairs, bonuses to creameries and cheese factories, and in various other ways.

MANUFACTURES. The great abundance of natural resources in Canada, including raw manufacturing material, affords a good basis for the upbuilding of the manufacturing industry. Additional advantages come from the abundance of fuel, particularly in Nova Scotia, where coal is plentiful, and from the widespread facilities for procuring water and electrical power afforded by the numerous rapids and falls characteristic of Canadian rivers. The thriving condition of Canadian industry is indicated by its trade statistics, which show that the value of the exports of manufactured articles, exclusive of lumber products, increased from $5,741,000 in 1890, to $14,224,000 in 1900. Of the resources upon which Canadian manufactures depend, the most important are her forests. (See LUMBER INDUSTRY.) In former days these furnished the material for extensive shipbuilding, but with the decreased use of wooden vessels this has become unimportant. There has, however, been a continuous growth in the manufacture of furniture, doors, sashes, and other wooden articles. As indicated by the export figures, the value of manufactures of wood was augmented from $870,000 in 1890 to $3,127,000 in 1900. The greatest increase was contributed by wood-pulp, the value of whose exports increased from $168,000 in 1890 to $1,816,000 in 1900. This is the product of the spruce forests, for which paper-making insures a lasting and growing demand. The abundance of hemlock is also of great importance, in view of the growing demand for it in the tanning trade. Leather is another article of growing importance. Boot and shoe manufacturing is carried on at Montreal and Quebec, a large part of the labor being done by French Canadian girls. Cottons are manufactured in Quebec and woolens in Ontario. The manufacture of iron and steel products is another rapidly developing branch of industry, most promising in Nova Scotia, because iron ore, coal, and limestone are there found in close proximity. The value of the exports increased from $294,000 in 1890 to $1,535,000 in 1900. At Winnipeg, Toronto, and a few other points, pork-packing is carried on.

LUMBER INDUSTRY. From an early day the forests of Canada have been one of her main sources of wealth and the making of lumber has been a leading factor in the industrial life of the people. In the eastern provinces the trees have been cut from large sections of the country, including almost the whole of Ontario south of the Canadian Pacific Railroad. Formerly little attention was given to judicious cutting, and the approach of the lumberman meant the destruction of the forest. Present laws furnish partial protection. Worse than the onslaughts of the lumbermen has been the destruction by fires, but an effort is now being made to guard against that also; nevertheless, some of the most valuable varieties of forest trees—notably the white pine—stand in danger of extermination. Owing to the very limited market in the West, the fine forests of Douglas fir and other useful trees are but little worked. The great forests of the country are Government property, and a large revenue is obtained therefrom. (See *Finance.*) The lumberman must first buy at auction a license to cut, after which he pays an annual rent on the ground and a royalty on the timber cut. Winter is the cutting season, when the snow affords means of transporting the logs to the streams, and the amount of the winter's yield is therefore dependent upon the duration of the snow. In former years the export of timber to English markets was generally in the log, but more recently mills have been established, and the logs are sawed before shipment. The exports of forest products increased from $26,000,000 in 1890 to $29,663,000 in 1900, the United States and Great Britain taking about equal quantities. Most of the product from the Great Lake region goes to the United States, while that from the Saint Lawrence and Maritime Provinces goes to Europe. White pine and spruce are the most important varieties.

TRANSPORTATION AND COMMUNICATION. Canada owes its commercial development in a great measure to its facilities for navigation, particularly on the Saint Lawrence River and Great Lakes. These great natural waterways have been further improved by the Government by means of a thorough-going canal system, so that vessels drawing 14 feet of water can now pass from Lake Superior to the Atlantic. It has been the ambition of the Canadians to make it possible for ocean steamers to pass directly to and from the lakes, but it has seemed impracticable so far to carry it out, and Montreal will probably continue to be the head of ocean navigation. The Saint Lawrence canals, which are nine in number, have a total length of 73⅜ miles, while those connected with the Ottawa and Rideau rivers have a total of 29¼ miles in length. A magnificent ship canal also connects Lake Superior with Lake Huron along the east bank of the Saint Mary's River. The total cost of constructing and maintaining all Canadian canals has been $95,316,000 (1900). Of other waterways, the Saskatchewan of the Western plains is destined to be of great importance as a means of transportation. It was in early days a canoe route to the Rocky Mountains, and now has steamboats running for long stretches on the North Saskatchewan. Steamboats also run for a long distance on the Red River. The Hudson Bay Company keeps a line of steamers operating upon the Mackenzie River for the benefit of its posts, and during the brief summer they pass back and forth between the mouth of the Athabasca and the mouth of the Mackenzie. There are also steamboats on the upper Fraser and Thompson rivers. Finally, the recent peopling of the Yukon district has caused a frequent steam service to be operated on that river and its larger headwaters, enabling passengers to go to any of the towns along the river by steamboat from the terminus of the White Pass Railroad, at White Horse Rapids, to its mouth. See ALASKA; YUKON GOLD-FIELDS.

The same zeal which has characterized Canada in the utilization of her waterways has led her to still greater efforts for the creation of an adequate railway system. It was realized that intercolonial and transcontinental railways were a necessity, not only for the opening up of the West and the commercial development of the whole country, but more particularly as a political measure, inasmuch as the railways would serve as a bond of union between the provinces, and indeed the assurance of such a road was a prerequisite of some of the provinces before they would enter into the present confederation. Thus it was that, among others, two of the principal lines—the Intercolonial and Canadian Pacific—were undertaken through Government initiative, and the former was completed and is still held by the Government. The latter, however, as is true of most other lines, was turned over to private hands, the Government conferring upon the company a grant of land and a cash subsidy, and the line thus provided for was successfully completed in 1887. With the development of the country the railroads are able to rely more and more on their own resources, although they still seem to be far from a position of entire financial independence of the Government. Aid to the railroads has been given by the provincial and municipal governments, as well as by the Dominion. Of the billion dollars of capital invested in the roads, 16 per cent. represents Dominion grants, 3.18 per cent. provincial grants, and 1.59 municipal grants. In 1900 it was estimated that 1217 passengers and 2036 tons of freight were carried to every mile of line open; the length of track amounted to 17,824 miles, 6800 of this being in Ontario. The Grand Trunk line and the other two lines above mentioned control about two-thirds of the total. Canadian lines connect with those of the United States by bridges across the Saint Lawrence, Niagara, and Saint Mary's rivers, by tunnels under Detroit

River, and at several points on the Southwestern frontier.

Commerce. The foreign trade of Canada shows a remarkable growth. The exports of domestic produce increased from $85.200,000 in 1890 to $170.600,000 in 1900. The largest item ($56.000,000) and the greatest absolute advance was in animals and animal products. Second in absolute and first in relative increase were the mine products. The export of agricultural and manufactured products each more than doubled during the period, but the increase of forest and fish exports was not so great. (See sections in this article on these different industries.) Great Britain and the United States receive most of the exports, the proportion going to Great Britain having increased during the period from 46 to 65 per cent., due to the great increase of agricultural and animal exports, most of which goes to that country. The mine products constitute the only export which goes almost exclusively to the United States. The exports of foreign products in 1900 amounted to $21.200,000. The imports for home consumption have similarly increased, being $180,800.000 in 1900, against $112,800,000 in 1890. Great Britain and most of her possessions enjoy preferential tariff rates admitting goods on a tariff rate 33⅓ per cent. less than the duty levied on goods from foreign countries.

The Canadian trade of the United States is next in importance only to that with Great Britain, Germany, and France. The exports from the United States to British North America are nearly three times as large as the imports. The following table shows the course of trade during the last decade of the century:

YEAR	Imports into British North America from United States	Exports from British North America into United States
1892	$44,885,988	$35,334.547
1893	48,628,508	38,186.342
1894	58,313,223	31,326,731
1895	53,981,768	37,006.163
1896	61,086,046	41,212,000
1897	66,028,725	40,722.792
1898	84,889,819	32,242.601
1899	89,570,458	31,604,135
1900	97,337,494	39,931,833
1902	111,702,275	48,887,573

It will be observed that while the exports from Canada to the United States remained stationary during the decade those from the United States to Canada increased nearly 150 per cent.

Banks. Every bank, in making payments, can be compelled to pay out a certain proportion of Government notes, and must hold of its cash reserve at least 40 per cent. in Government notes. In 1900 the various banks and their branches had a total capital of $65.000,000, with $46,500,000 in circulation, $305.000,000 on deposit, $356,-40.000 in liabilities, and $459,700.000 assets. Post-office savings banks have been in operation since 1867; in 1900 the depositors numbered 150,900, and the average deposit amounted to $248. There are also Government savings banks in Ontario, Nova Scotia, New Brunswick, Manitoba, British Columbia, and Prince Edward Island.

Government. By the terms of the British North America Act of 1867, the provinces of Ontario and Quebec, known also as Upper and Lower Canada, joined with the Maritime Provinces of Nova Scotia and New Brunswick to form a Federal Government under the name of the Dominion of Canada. Since that time the original number of provinces has been increased to seven by the admission of Manitoba, British Columbia, and Prince Edward Island, and the public territory of the Dominion has been augmented by the purchase of the Northwest Territories from the Hudson Bay Company; but the Constitution drafted in 1864 and embodied in the act of 1867 is still in force. Based upon the general principle of the definite division of powers between provincial and central governments, the Canadian Constitution differs from that of the United States in the fact that all powers not explicitly assigned to the provinces are reserved to the central Government. Under the exclusive jurisdiction of the Federal Legislature are the administration of the public debt and property, the imposition of taxes for general purposes, the organization of the public defense, including the militia; the subjects of banking, paper money, promissory notes, legal tender, currency, and coinage; the regulation of commerce, navigation, and shipping; the coast service, the postal service, census, statistics, patents, and copyright; naturalization, aliens, and Indians; marriage and divorce. The subjects within the scope of the provincial legislatures are, among others, those of taxation for local purposes, the regulation of local commerce, the erection of municipal corporations, the borrowing of money on the credit of the province. On the questions of agriculture and immigration, the Federal and the provincial legislatures possess concurrent jurisdiction; but it is provided that in the contingency of a conflict of legislation, the law of the Dominion shall prevail. Although the powers of government have, in this manner, been definitely portioned out, there has been no lack of intrusion on the part of either party into the sphere of the other. On such occasions, when compromise has been found impossible, the principle of the superior authority inherent in the central Government has been adhered to. Striking examples of this predominance are the right given the Governor-General to disallow within a year any law enacted by the provincial legislatures and the power of appointing the Lieutenant-Governors of the provinces.

The lawmaking power of the Federal Government is vested in the King of Great Britain or his representative and the Dominion Parliament. The Parliament, the seat of which is at Ottawa, is composed of an Upper House or Senate and a Lower House or House of Commons. The members of the Senate, who are appointed for life by the Governor-General, must be subjects of the King, 30 years of age, residing in the province whence they are summoned, and owning property there to the value of $4000. At present there are 81 Senators, of whom 24 are from Ontario, 24 from Quebec, 10 from New Brunswick, 10 from Nova Scotia, 4 from Prince Edward Island, 4 from Manitoba, 3 from British Columbia, and 2 from the Territories. The House of Commons is elected practically by manhood suffrage for a period of five years, on the basis of population. Officers of the civil service and Government contractors may not sit in Parliament. It is provided that Quebec shall always have 65 representatives in the Commons, and the other provinces a number bearing the same ratio to their population as 65 bears to the population of Quebec. On the basis of the census of 1901 the representation in Parliament comprised 92 members for Ontario, 65 for Quebec, 18 for Nova Scotia, 13 for New Brunswick, 10 for Manitoba, 9 for British Columbia, 4 for Prince Edward Island, and 6 for the Territories.

The executive power is vested in the King or his representative (the Governor-General) and a Privy Council composed of a premier, thirteen heads of departments, and two ministers not of the Cabinet. The governmental departments are those of State, Trade and Commerce, Justice, Marine and Fisheries, Railways and Canals, Militia and Defense, Finance, Posts, Agriculture, Public Works, Interior, Customs and Internal Revenue. The principles regulating the relations of the executive to the legislature, and of the two branches of the legislature to each other, are the same as those that underlie the parliamentary scheme of government in Great Britain. The Governor-General is practically guided by his ministers, who in turn are responsible to the House of Commons; and though the executive may reserve a law for the consideration of the home Government, or disallow it altogether, the latter right is in practice never exerted, and the former is employed only when a measure concerns the interests of the Empire at large and tends to affect the relation of the Imperial Government to foreign powers. Within Parliament the predominant power is wielded by the popular chamber. Not only must money bills originate in the Commons, but the Senate may not even amend a bill from the Lower House; its power of rejection is seldom employed, and though it possesses the right of initiative in many matters, its share in originating legislation is quite inconsiderable.

Of the provincial governments and of the differentiation between their scope of authority and that of the State, it may be said that in general they are endowed with the full power of control over local affairs, subject only to the consideration of the general welfare of the Empire. A detailed description of provincial governments will be found under the names of the several provinces.

The judicial branch of the Federal Government consists of a Supreme Court at Ottawa, with appellate civil and criminal jurisdiction throughout the Dominion, and an Exchequer Court with powers of admiralty. There are no inferior Federal courts, but the central government avails itself of the judicial machinery in each of the provinces, which comprises a superior court, county courts, police magistrates, and justices of the peace. To be precise, however, the superior and county courts are not exclusively State tribunals, in that their judges are appointed by the Governor-General of the Dominion. The penitentiaries, too, are under the care of the Federal Government.

Army.—The King is the commander-in-chief of the naval and military forces, but the control of them is in the hands of the Dominion Parliament. Except a garrison of 2000 British troops at Halifax there is no regular army in Canada; the defense of the Dominion is intrusted to the militia, which comprises all British subjects between the ages of 18 and 60, and is divided into an active force serving for three years and a reserve force, which includes all non-active citizens liable to service. The active militia is raised by voluntary enlistment or by draft, and is limited by law to 40,000 men. On June 30, 1901, the effective force numbered 38,090 officers and men. The Dominion takes no share in the naval defense of the country, which is left entirely to the Imperial Government.

FINANCES. The central Government controls the collection of the customs revenue, and over half the receipts come from this source. Free trade exists between the provinces. The customs revenue increased from $23,900,000 in 1890 to $28,800,000 in 1900; the internal revenue during the same period increased from $7,600,000 to $9,800,000, and the revenue from other sources increased from $8,293,000 to $13,800,000. The provinces surrendered to the central Government the power of collecting the customs revenue only on condition that they should receive in return annual subsidies. In 1890 the subsidies aggregated $4,100,000, in 1900 $4,250,000. Of the other principal items of expenditure, the charges on the public debt increased during the decade from $9,656,000 to $13,400,000; railways and canals remained about constant, viz. $5,311,000 and $5,400,000, while the public works charges decreased from $4,892,000 to $2,400,000. The total expenses for 1900 were $44,000,000. The per capita receipts were $9.50; the per capita expenditure $8. The net debt of the Dominion is $265,000,000.

POPULATION. In 1703 the French population amounted to about 65,000, confined to the immediate vicinity of the lower Saint Lawrence and its tributaries; in 1791 Upper Canada had 50,000 inhabitants and Lower Canada 130,000. In 1861 the total population, exclusive of Indians, was 3,090,561; in 1871, 3,635,024; in 1881, 4,324,810; in 1891, 4,833,239; and in 1901, 5,371,315. In 1901 there were 3,065,799 persons of English origin, 1,649,352 of French, and 309,741 of German. The following table shows the distribution of the population by divisions in the years 1891 and 1901:

PROVINCES	1891	1901
British Columbia	98,000	178,000
Manitoba	152,000	255,000
New Brunswick	321,000	331,000
Nova Scotia	450,000	459,000
Ontario	2,114,000	2,182,000
Prince Edward Island	109,000	103,000
Quebec	1,488,000	1,648,000
Territories { Alberta Assiniboia Saskatchewan }	66,000	158,000
Unorganized Territories	32,000	52,000

It will thus be seen that the Canadian population increases but slowly, the growth for the last decade being less than 10 per cent., not so great as would result from the natural increase by birth, the birth-rate being high, as indicated by the average size (5.1 +) of families. The most marked growth has taken place in the Western region. Much of this is attributed to the increased interest in mining. According to the census of 1901, the foreign-born were distributed as follows: British Islands, 290,016; British possessions, 15,837; foreign countries, 278,804 (United States, 127,891); not given, 14,589. In the eastern provinces large numbers have crossed the international boundary into the States—

particularly into the New England States. There is a decided tendency on the part of many Canadians to pass back and forth across the boundary according to seasonal changes in the labor market. The population of Canada includes a large variety of race elements, and the process of amalgamation has been much less active than in the United States. The great expanse of area and the sparseness of the inhabitants admits of isolation, and is largely responsible for the lack of amalgamation. The French, who were the first settlers, located principally along the Saint Lawrence, in what is now the Province of Quebec, and their descendants still constitute a large majority of the inhabitants of that province. In the determination of the policy of the British Government formerly, and of the Dominion today, the presence of this French element has been and is a main consideration. The French language is still commonly spoken, and is even permitted and often heard in the Dominion Parliament. The French were the hunters and trappers of the early days, and in this capacity scattered throughout the vast domain, mingling freely and amalgamating with the Indians, which accounts for the population of half-breeds so largely represented in Manitoba and the Northwest Territories. The French Canadians are well represented also in the recent Western colonization. In the other Eastern provinces people of British descent are in the great majority—the Scotch in Nova Scotia and the English in the other three. The Irish are well represented in the larger cities. The eastern townships of Quebec were settled by loyalists from the revolted American colonies, who emigrated there during or following the time of the American Revolution. Ontario received a large contingent of the New England opponents to the War of 1812.

In 1900 the Indians in Canada were estimated at 99,000, as follows: British Columbia, 24,523; Manitoba and the Northwest Territory within treaty limits, 24,468; Ontario, 20,703; Northwest Territories outside of treaty limits, 14,566; Quebec, 10,785; Nova Scotia, 2018; New Brunswick, 1639; Prince Edward Island, 308. The number seems to be decreasing, but, owing to the uncertain accuracy of the early enumerations, it is impossible to ascertain the amount of the decrease. The care of the Indians is in the hands of the Indian Department of the Dominion Government, which has a superintendent of Indian affairs in each province. Reservations are provided for the different tribes, but the Indians are not necessarily confined to them. Special provisions, such as annuities and financial assistance, are provided for the Treaty Indians. Others, however, such as those of British Columbia, successfully support themselves. Acts passed by the chiefs and councilors for the regulation of local affairs may be enforced if approved by the Government. Rights of franchise and full citizenship are given the tribes as they become sufficiently advanced in civilization. Much progress is being made in this direction, especially by the tribes of British Columbia, yet hunting and fishing remain their chief occupations, though they work in many sawmills, fisheries, etc. Intertribal conflicts are of rare occurrence, nor has their relation with the General Government been characterized by so great a degree of friction as has prevailed in the United States.

Religion.—There is no State Church, but to the Roman Catholic Church in Quebec are guaranteed the privileges enjoyed previous to British possession. This Church was the first and for a long time practically the only Church in the Canadian territory, and still includes the great mass of the population of Quebec, and over two-fifths of the total church membership of the Dominion. The Catholics are of least relative importance in Ontario and Manitoba. The Methodists, Presbyterians, and Anglicans rank next in order of importance. While all these are well distributed throughout the various provinces except Quebec, the Methodists are far in the lead in Ontario, but are exceeded by the Presbyterians in some of the other provinces, particularly Nova Scotia. Neither of the two latter denominations is divided into numerous factions, as in the United States. Of other denominations, the Baptists and the Lutherans are the strongest. The leading sects have each one or more divinity schools. The following table gives the membership of the leading denominations:

DENOMINATIONS	1891	1901
Anglicans	646,000	680,300
Baptists	257,400	292,400
Baptists (Freewill)	45,100	24,200
Congregationalists	28,100	28,200
Lutheran	63,900	92,300
Methodists	847,700	916,800
Presbyterians	755,300	842,300
Roman Catholics	1,992,000	2,228,900

Cities.—The per cent. of urban population is low. Winnipeg, Vancouver, and Sydney had the highest rate of increase during the last decade. The following gives the population of the principal cities, as returned by the census of 1901: Montreal, 266,000; Toronto, 207,000; Quebec, 68,000; Ottawa, 59,000; Hamilton, 52,000; Winnipeg, 42,000; Halifax, 40,000; Saint John, 40,000; London, 38,000; Vancouver, 26,000.

EDUCATION. There is no centralized system of education for the whole Dominion, each province being left to control its own educational matters. For a fuller statement, therefore, the reader is referred to the articles on the different provinces. In all provinces the schools are free, and in most provinces attendance is compulsory. Local trustees are elected to look after the separate schools, but a careful supervision is exercised by the provincial superintendent and his council. Especially noteworthy is the thorough and comprehensive school system of Ontario. In provinces where Catholics have a strong representation (Quebec, Ontario, and Manitoba), the denominational problem has been the most important one that has confronted the educational system, and in the case of Manitoba it has been of a rather grievous nature. In Quebec there is a complete cleavage between the two sects, extending even to the council of public instruction, which is divided into Catholic and Protestant committees, the former committee being composed of Roman Catholic bishops. In Ontario the educational council is not divided, but either sect, under certain conditions, can establish separate schools. In Manitoba there are no separate schools, but religious instruction may be given to those pupils whose parents may demand it. The expense of the schools is met by Government grants and local taxation, the latter covering more than two-thirds of the expenditure for all the provinces, but differing greatly from province to province. There are a large number of universities and classical colleges, including Dalhousie, Nova Scotia (founded 1820); Montreal (1821); New Brunswick, Fredericton (1828); University of Toronto, Ontario (1828); Queen's College, Kingston, Ont. (1841); Laval University, Quebec (1852); University of Manitoba (1877); and the Royal Military College, Kingston, Ont. (1874). The principal scientific societies are the Royal Society of Canada; Natural History Society of Montreal; Canadian Institute, Toronto; Nova Scotia Institute; Natural History Institute, New Brunswick; Scientific and Historical Society, Winnipeg; and Society of Natural History, Victoria, with a fine local museum.

HISTORY. It is probable that Bjarni Herjulfson (q.v.), a Norseman, sighted the coast of Canada, opposite Greenland, in 986, and that Leif Ericson sailed along a considerable part of the eastern coast in 1000. John Cabot (q.v.) in 1497 reached the shores of the New World in the neighborhood of the Gulf of Saint Lawrence. It is upon this voyage that England subsequently based her claim, in part, to the whole of North America. For the most part, however, the territory included within the present Dominion, excluding the former Northwest Territories and the Hudson Bay country, was explored and first settled by the French. Basque and Breton fishermen began to visit the cod-banks of Newfoundland as early as 1504; Denis of Honfleur and Aubert of Dieppe explored the Gulf of Saint Lawrence in 1506 and 1508, respectively; the Baron de Léry made an unsuccessful attempt to settle Sable Island in 1518; and in 1524 Verazzano, under the direction of Francis I., sailed along the coast of North America from the thirty-fourth to the fiftieth parallel of north latitude. In 1534 Jacques Cartier (q.v.) entered the Saint Lawrence and at Gaspé took formal possession of the country in the name of the King of France; and on a second voyage, in 1535-36, he ascended the river as far as Hochelaga (Montreal), wintered at Stadaconé (Quebec), and, while passing up the stream, entered the present harbor of Sainte-Geneviève, and gave it the name Saint Lawrence, which was afterwards extended to the gulf and the river. Jean François de la Roque, Sieur de Roberval (q.v.), with the assistance of Cartier, made an abortive attempt to establish a colony at Cape Rouge in 1541-43. The Marquis de la Roche received a commission from the King as lieutenant-general of Canada, and in 1598, having bargained to colonize New France, established a short-lived settlement on Sable Island; and in the following year Pontgravé and Chauvin established an equally short-lived settlement at the mouth of the Saguenay. In 1603 Champlain made the first of his voyages to Canada, and his name is inseparably connected with the history of New France from that date until the time of his death, in 1635. (See CHAMPLAIN, SAMUEL DE.) In 1604 he assisted Pierre du Guast, Sieur de Monts, in bringing out a colony which first settled on Dochet Island, in the Saint Croix, and in the following year was moved to the site of the present Annapolis in Acadia or Nova Scotia (q.v.). This colony, however, was broken up temporarily by the English under Samuel Argall, in 1613, and the first permanent settlement in Canada was made at Quebec in 1608 by Champlain, who within the next few years discovered lakes Champlain (1609), Huron (1615), and Erie (1615), established a temporary settlement at Montreal (1611), and by taking part with the Hurons and Algonquins, the original inhabitants of Canada, against the Five Nations, in 1609 and 1615, committed France to a policy which was to be of the greatest significance in the history of New France, arousing, as it did, the enmity of the powerful Iroquois, who united first with the Dutch and then with the English, and frequently thwarted the French in their schemes of expansion and conquest. In addition to making numerous inroads upon the settlements of the French themselves, they in time virtually annihilated the Hurons, who had allied themselves to France. "They ruined," says Parkman, "the trade which was the life-blood of New France; they stopped the current of her arteries and made all her early years a misery and a terror." The French governors repeatedly attempted to overcome the Confederacy, and at times seemed on the point of meeting with success; but in spite of severe reverses and of the occasional destruction of their towns, the Iroquois continued to stand as a barrier to French encroachments and as a protection to the English colonists, though, largely as a result of the vigorous policy of Frontenac (q.v.), the ablest of the French governors after Champlain, their aggressions and inroads virtually ceased in the beginning of the Eighteenth Century. In 1625 several Jesuits arrived at Quebec, and for almost half a century thereafter the order had a preponderating influence over secular as well as religious affairs, insomuch that during the early period of its history New France was in many respects essentially a mission. The affairs of the colony having been grossly mismanaged in the first two decades, Richelieu, in 1627, organized the Company of New France, better known as the 'Company of the Hundred Associates'—a corporation which, under the quasi-supervision of the Crown, virtually ruled the whole of New France until 1663, besides exercising a monopoly over the immensely valuable fur trade. In 1642 Montreal was permanently founded by a company of religious enthusiasts headed by the Sieur de Maisonneuve, and in 1659 Laval-Montmorency (q.v.), the titular bishop, by papal appointment, of Petræa in Arabia, was placed at the head of the Catholic Church in New France, in which capacity he had a powerful influence for many years over civil as well as ecclesiastical affairs.

In 1663 Louis XIV. dissolved the Company of New France and placed Canada under the direct control of the Crown, though for ten years thereafter (1664-74) a new corporation, the 'Company of the West,' exercised a virtual monopoly over the trade of the colony. Under the royal Government, which lasted until 1760, the affairs of New France were administered by a Governor, an Intendant, and a Superior Council, all appointed by the Crown, the Governor being empowered to command the troops, conduct negotiations with foreign colonies and Indian tribes, and supervise all matters of administrative routine; the Intendant to preside at the Council, exercise independent legislative and judicial power, and supervise the expenditure of all public moneys, besides acting virtually as a spy on the Governor; and the Supreme Council, composed of the Governor, the Intendant, the Bishop, and five, later seven, and still later thirteen, councilors, to issue decrees for the government of the colony in civil and fiscal affairs, and to sit in judgment on various civil and criminal causes. The distinctive features of the government of Canada throughout the French régime were absolutism and paternalism, the individual settler being robbed of all initiative and forced to look for everything to the general Government, which habitually intervened in the most trivial affairs of every-day life. During the period of royal control, the celebrated feudal system of Canada, first established by Richelieu, and based, with important modifications, upon the system which had obtained in ancient France, took definite form. Large grants, called *seignories*, were made to men of rank or prominence, known as *seigneurs*, who held, in many cases directly from the Crown, by the 'tenure of faith and homage,' and who, in turn, made smaller grants to the *habitants* or *censitaires*, whose tenure rested upon their payment of annual rentals in money or produce, and in some cases upon their rendering to their over-lords certain feudal services, such, for instance, as the *corvée*. The settlements, called *côtes*, were almost uniformly made along streams, the houses being built in long lines, instead of being arranged around a common centre, as was the case in many of the New England villages—each *habitant* receiving a narrow strip of land, fronting on a river or creek and extending for a considerable distance to the rear. The system was not interfered with at the time of the English conquest in 1760, and survived in Lower Canada (Quebec) until 1854, when it was finally abolished.

With the English Colonists to the south the inhabitants of New France came into conflict during the last part of the Seventeenth Century. Such events as the destruction of the French settlement at Port Royal by Argall in 1613, or the capture and occupation of Quebec by David Kirke in 1629-32 may be regarded as sporadic; but with the outbreak of the first of the so-called French and Indian wars in 1689, the long contest between the French and English for supremacy in North America was initiated. (See KING WILLIAM'S WAR; QUEEN ANNE'S WAR; KING GEORGE'S WAR; FRENCH AND INDIAN WAR.) Of these wars, the first two especially, 1689-97 and 1702-13, may be differentiated from the last as being essentially the fighting out of European quarrels on American soil. On the part of the French, the conflict took the form of sudden raids, with the help of their Indian allies, on the frontier settlements of New York and New England. Though no important victory was gained on either side, the English nevertheless acquired by the Treaty of Utrecht (1713) Acadia, Newfoundland, and the Hudson Bay Territory. Thirty-five years of peace followed, marked by rapid development both among the French and the English. The tide of English colonization, breaking through the passes of the Alleghanies, was checked by the French, who had made themselves masters of the great rivers of the west. The war which broke out in 1754 was essentially American, and though it later merged into the greater struggle of the Seven Years' War, the stake between England and France was the mastery in America. In the French and Indian War, Canada experienced both the advantages and disadvantages of the absolute system of government under which it lived. Against the armies of Great Britain, weakened by incapacity on the part of their commanders and constant friction between British officers and the Colonials, it presented a force of trained fighters, under officers, for the most part, acquainted with the nature of the country, and acting all under the direction of one supreme will. This would account for the ill success of the English during the first part of the war. When it came, however, to a test of endurance between the combatants, Canada, with its sparse population of fur traders and forest rangers, could never hope to hold out against the English Colonists, if, as was the fact, it was forced to depend for help on distant France, with the British holding the mastery of the seas. The capture of Quebec by Wolfe in September, 1759, practically ended the war. By the Treaty of Paris (q.v.) in 1763, Canada, together with all the territory between the Alleghanies and the Mississippi River, claimed by France, was ceded to Great Britain.

Canada was under a military government from 1760 to 1764, and under a sort of provisional government, organized in pursuance of a proclamation by George III., from 1764 to 1774, when the British Parliament passed an important measure known as 'The Quebec Act' (q.v.), which extended the province to the Ohio and Mississippi rivers, provided that Roman Catholics should not be interfered with in their religion, intrusted the administration of affairs to a Governor and a Legislative Council appointed by the Crown, and formally recognized the old civil laws and civil institutions of French Canada, though the English criminal laws were to be in force throughout the province. During the American Revolution, the Continental Congress attempted to secure the active alliance of Canada, and to that end sent a commission, made up of Franklin, Chase, Charles Carroll, and John Carroll, to Quebec; but the province remained loyal throughout, and at the close of the war its population was augmented by the immigration from the United States of between 30,000 and 40,000 Loyalists, whose advent, says the Canadian historian Bourinot, "was the saving of British interests in the great region which England still happily retained in North America." It was these immigrants who founded New Brunswick and Upper Canada (Ontario), and their descendants have continued to the present day to constitute perhaps the most important and influential element in the population of Canada.

By the treaty of 1783, the area of Canada, as established by the Quebec Act, was reduced by the formal relinquishment to the United States of the territory now constituting the States of Wisconsin, Michigan, Ohio, Indiana, and Illinois, and in 1791 the province was divided by the so-called 'Constitutional Act' into two sections, 'Upper Canada' and 'Lower Canada,' the former of which, then having a population of about 20,000, was inhabited almost entirely by men of English descent, and the latter, then having a population of about 125,000, largely by men of French descent. Each section was to have a Legislative Council, to be appointed by the King, for life; an assembly, to be chosen by a popular vote; and a Governor and Executive Council, to be appointed by the King; while French institutions were for the most part to obtain in the one and English institutions in the other. The so-called 'Maritime Provinces'—New Brunswick, Nova Scotia, Cape Breton, and Prince Edward Island—were placed under administrations very similar to that of Upper Canada. In Lower Canada a party of discontent almost immediately arose, and until the reorganization of the Government, in 1841, there was almost continual friction between the Popular Assembly on the one side, representing the French element, and the Governor and Legislative Council on the other, representing almost exclusively the English element. In spite of the unifying influence of the War of 1812 with the United States (see UNITED STATES, *History*), in which men of all races throughout Canada participated, this racial antagonism became more and more accentuated, until, in 1837, a certain element of the French population, under the leadership of Louis J. Papineau (q.v.), angered by the intervention of the British Government, rose in revolt against the British authority, but were quickly suppressed.

Meanwhile in Upper Canada much discontent was caused by the political dominance of a small class, descended from the Loyalists, and united, it was charged, under an alleged 'family compact' for the purpose of monopolizing the public offices. The popular dissatisfaction with the prevailing state of affairs was greatly increased by religious antagonisms and by the exposure, through the agency of one Robert Gourlay, of apparent frauds in the disposition of public lands. In 1837, also, the more radical of the reformers, doubtless encouraged by the outbreak in Lower Canada, organized a 'rebellion,' under the leadership of William L. Mackenzie (q.v.), but were defeated and driven out of the province before the close of the following year. Meanwhile Lord Durham had been sent out from England as Governor-General and high commissioner "for the determining of certain important questions depending in the provinces of Upper and Lower Canada, respecting the form and future government of the said provinces," and, largely as a result of the famous report made by him in 1839, the two provinces were reunited, in 1841, by an act of Parliament, which provided for a Governor, to be appointed by the Crown, a Legislative Council, also to be appointed (for life) by the Crown; a Legislative Assembly, to which Upper and Lower Canada were to send an equal number of representatives, to be elected by popular vote; and an Executive Council, or Cabinet, to be chosen by the Governor from the Legislative Council and the Legislative Assembly. The Maritime Provinces, meanwhile, retained their separate governments.

After the union of Upper and Lower Canada, the advantages of a federal union of all the provinces became more and more apparent, especially since, by reason of the plan of equal representation, and the unequal growth of the two united provinces, a reorganization of some kind was rendered imperative. In 1864 a convention of delegates representing the various provinces was held at Quebec for the purpose of considering the advisability of union, and under the leadership of Sir John Macdonald (q.v.) formally adopted a set of resolutions, which served as the basis for the Act of Union passed by the British Parliament in February, 1867. Under this act, the provisions of which are given in another part of this article, Upper and Lower Canada, Nova Scotia, and New Brunswick were formally united as the Dominion of Canada, which subsequently—in 1871 and 1873, respectively—received the accession of British Columbia and Prince Edward Island. Newfoundland, however, refused to enter the union, and still continues to hold herself aloof. The vast territory which since 1670 had been under the control of the Hudson Bay Company, was acquired by the Dominion in 1869—an event which provoked an uprising, along the Red River, of the half-breeds under Louis Riel (q.v.), and in 1870 this territory was subdivided into Manitoba, which was immediately admitted into the Dominion on equal terms with the other provinces, and the Northwest Territories, out of which districts were subsequently created as follows: Keewatin, in 1876; Assiniboia, Saskatchewan, Alberta, and Athabasca, in 1882; and Ungava, Mackenzie, and Franklin in 1895. The principal events since the creation of the federation in 1867, in addition to those already mentioned, have been the raids of the Fenians in 1870-71, who had also made a desultory attack in 1866 (see FENIAN SOCIETY); the adoption of a high customs tariff in 1876; a second outbreak of the half-breeds and Indians under Riel in 1885; the completion of the Canadian Pacific Railroad in the same year; and the agitation in Newfoundland (1887-91) over encroachments by French fishermen.

The boundary line between Canada and the United States, which was determined with considerable vagueness by the treaty of 1783, has formed the subject of much controversy between the United States and Great Britain, and was not finally settled for the northeast until 1842, and for the northwest until 1846. The question of the right of the Americans to fish in Canadian waters has also been the subject of considerable controversy between the two governments (see SEALING), as has also the right of the Canadians to participate in the seal fisheries in Bering Sea (see BERING SEA CONTROVERSY). From 1854 to 1866 there was a reciprocity treaty with regard to trade and commerce between Canada and the United States, and since its repeal frequent attempts without avail have been made by the Canadian Government to secure its renewal.

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CANADA BALSAM, or CANADA TURPENTINE. A kind of turpentine obtained from the Balm of Gilead fir (*Abies* or *Picea balsamea*), a native of Canada and the northern parts of the United States. It is a greenish-yellow, transparent liquid, having an agreeable odor, resembling that of turpentine, and a bitterish, acrid taste. When freshly exuded from the tree, it has the consistency of thin honey; on exposure to the air, however, it gradually dries up, forming a solid, transparent mass. Canada balsam is an oleoresin, consisting of 20 to 30 per cent. of a volatile oil, and 70 to 80 per cent. of a solid, composed mainly of two varieties of resin. It is the finest kind of turpentine obtained from any of the coniferæ, and was formerly employed for medicinal purposes, particularly as a stimulant for the cure of mucous discharges, and as a detergent application to ulcers. It is now used for a variety of purposes in the arts—as an ingredient in varnishes, in mounting objects for the microscope, in photography, and by opticians as a cement, particularly for connecting the parts of achromatic lenses to the exclusion of moisture and dust. Its value for optical purposes is very great, and depends not only on its perfect transparency, but on its possessing a refractive power nearly equal to that of glass.

CANADA CLERGY RESERVE. See POLITICAL PARTIES, *Canada*.

CANADA HEMP. See DOGBANE.

CANADA JAY, PORCUPINE, etc. See JAY; PORCUPINE; etc.

CANADA SNAKEROOT. See ASARABACCA.

CANADA THISTLE. See THISTLE.

CANADIAN LITERATURE. A classification under which is grouped the large company of writers, both French and English, who are connected with the Canadas by birth or by residence. The expression is open to some objection, but has been adopted for the sake of convenience. French Canada, comprising mainly the Province of Quebec, long severed from France, has developed an interesting phase of French literature, and English Canada, comprising, so far as her literature is concerned, mainly the Maritime Provinces and Ontario, has her own traditions and history.

French Canada.—Canada was first settled by the French, who established their largest colonies in the valley of the Saint Lawrence. Quebec early became the centre of some culture. The Jesuit college founded there in 1635 anticipated Harvard by one year. In 1639 an Ursuline convent was also opened, and later in the century Laval, the famous Bishop of Quebec, established his seminaries, which have since developed into the great Roman Catholic university. The first books, written by explorers and Roman Catholic missionaries, deal with discovery, tradition, and history. Champlain (q.v.), the founder of Quebec (1608), published many admirable narratives, beginning with a description of his first voyage, 1599-1601. His works, frequently issued in Paris during the Seventeenth Century, have been carefully edited by Laverdière (6 vols., Quebec, 1870). Lescarbot (q.v.), who bore a part in the settlement at Acadia (Nova Scotia), published the interesting *Histoire de la Nouvelle France* (Paris, 1609), to which was added a collection of poems called *Les muses de la Nouvelle France.* Other works produced under the French régime are: Gabriel Sagard's *Grand voyage* (Paris, 1632); Pierre Boucher's *Mœurs et productions de la Nouvelle France* (Paris, 1864); the narratives of missionary adventure known as the *Relations des Jésuites*, edited, with English translation, by R. G. Thwaites (71 vols., Cleveland, Ohio, 1896-1901); La Potherie's *Histoire de l'Amérique Septentrionale depuis 1534 jusqu'à 1701* (4 vols., Paris, 1722); the Jesuit Lafitau's *Mœurs des sauvages amériquains* (Paris, 1724); and Le Clercq's *Etablissement of la foy* (2 vols., Paris, 1691; English translation by J. G. Shea, New York, 1881). The line of these early writers closes with Charlevoix (q.v.), a Jesuit traveler, whose *Histoire et description générale de la Nouvelle France* (3 vols., Paris, 1744; English translation by J. G. Shea, 6 vols., New York, 1866-72) is a work of great merit. Taken altogether, the books composed by priests and officials form a body of history unequaled in interest and style by anything produced elsewhere in America during the same period. The peasantry, too, brought with them from Brittany and Normandy many popular songs which in course of time became imbued with the scenery and spirit of the new land. Orally transmitted from generation to generation, they were written down at a later period. A collection of these popular songs was edited, with music, by Ernest Gagnon (Quebec, 1865), and a translation was made by William McLennan under the title *Songs of Old Canada* (Montreal, 1886). Of them, one of the choicest is the love song, with interlocked stanzas, beginning, "A la claire fontaine."

By the Treaty of Paris (1763) Canada passed into the hands of the English. Then followed a period of strife and bickering which did not close until 1867, when the provinces were united under the name of the Dominion of Canada. Awakened by the civilization of her conquerors, French Canada, which still holds to her own language, produced her first native-born writers. Among them were several historians of their country. Michel Bibaud was the earliest, with the *Histoire du Canada sous la domination française* (Montreal, 1837), and the *Histoire du Canada sous la domination anglaise* (Montreal, 1844). In 1845 François Xavier Garneau published the first volume of his *Histoire du Canada*, from the discovery to his own time. This great work, completed in 1852, is regarded by the French as the standard authority on their history. Other admirable histories have been written by J. B. A. Ferland, a priest and professor of Laval University; the Abbé Faillon, a Sulpician priest, born in France, but long a resident of Canada; Louis Turcotte, who was connected with the legislative library of Quebec; Benjamin Sulte (q.v.), a prolific contributor to the periodical press and learned societies; the Abbé Casgrain, who has given much attention to the time of Montcalm and Lévis, and whose *Pèlerinage au pays d'Evangeline* was crowned by the French Academy in 1888; and the Abbé Tanguay, sometime professor of archæology in Laval University, and author of the *Dictionnaire généalogique des familles canadiennes*, a work of immense research.

French Canada has her own newspapers and periodicals, which have made an audience for the essay, the sketch, and the novel. Faucher de Saint-Maurice (q.v.), a journalist, who served in Mexico under Maximilian, wrote *De Quebec à Mexico; Les Provinces Maritimes;* and many other volumes of description. Sir James MacPherson LeMoine is the author of a large number of legendary, historical, and critical sketches both in French and in English, as *L'ornithologie du Canada* (1861); *The Chronicles of the Saint Lawrence* (1879); and *Picturesque Quebec* (1882). Arthur Buies, who has edited several journals, began in 1871 the publication of his popular *Chroniques*, which extended to several volumes. He has also written many other pieces of delightful description, as *Le Saguenay et la vallée du Lac Saint Jean* (1880). L. O. David, who opposed the union of the Canadas, is regarded as one of the most brilliant of recent writers. His *Patriotes de 1837-38* (1884) and *Les deux Papineau* (1896) are a defense of the rebellion of the French Canadians in 1837. In *Le clergé canadien* (1896) he vigorously attacked the Roman Catholic clergy for meddling in politics. Besides these works, he is author of *Biographies et portraits* (1876) and *Mes contemporains* (1894). Among other essayists schooled in journalism are Alfred Duclos de Celles and Narcisse Eutrope Dionne. The former has written much on social and political questions, and his *Etats-Unis: Origine, institutions, développements* (1896) won the prize of the French Academy of Political and Moral Sciences. The latter is author of *Jacques Cartier* (1889); *Samuel Champlain* (1891 et seq.); and other historical sketches, written in a finished style. For the historical romance, Canada possesses richer material than the United States; but no Cooper has yet appeared among either the French or the English population. Still, there have been some noteworthy attempts at historical fiction. A pioneer work was Philippe de Gaspé's *Les anciens Canadiens* (1863), which was translated into English. De Gaspé was followed by Joseph Marmette, who wrote four historical romances—*François de Bienville* (1870); *L'intendant Bigot* (1872); *Le chevalier de Mornac* (1873); and *La fiancée du rebelle* (1875). The first in the list passed through several editions, and may be taken as one of the best specimens of historical romance yet produced by French Canada. Among other novelists who have met with a measure of success are P. J. O. Chauveau and L. P. LeMay, the latter better known as a poet.

The French Canadians, though they have cultivated history, the descriptive sketch, and the novel, excel in their verse. We have already mentioned the popular ballads which their ancestors brought over seas from old France. Recent French-Canadian verse, though lacking in depth, is graceful and rhythmical. The chief poet is Louis Honoré Fréchette (q.v.), whose *Fleurs boréales* and *Les oiseaux de neige* were crowned by the French Academy in 1880. His finest poem is on the discovery of the Mississippi. Next to him is ranked Octave Crémazie, who passed his last years in France. His poems, which were contributed to various Canadian journals, were collected and published, with an introduction by the Abbé Casgrain, in Montreal, in 1882. They include a beautiful elegy on *Les morts*, and a stirring lyric on *Le drapeau de Carillon*, recalling the victories of Montcalm and Lévis. Léon Pamphile LeMay, already mentioned for his stories of Canadian life, gained fame far beyond his country for a translation (1870) of Longfellow's "Evangeline." He has also published several volumes of original verse, beginning with *Essais poétiques* (1865). As in the case of Crémazie, his best poems are patriotic lyrics. To the same group of poets belongs, too, the historian Benjamin Sulte (q.v.), who, by *Les Laurentiennes* (1870) and *Les chants nouveaux* (1880), inspired by the songs of his people, won the title of national poet.

English Canada, settled by English, Irish, Scotch, and Germans, was really built up by the Loyalists (known in the United States as Tories) who emigrated from the United States at the close of the Revolutionary War. It is estimated that fully 35,000 left their southern homes. Some settled in Nova Scotia, and others founded New Brunswick and Upper Canada, or Ontario. During the period of struggle that followed down to the union of 1867, men had little time to devote to literature. As in the case of the French in Lower Canada, or Quebec, the first writers were explorers and historians. Samuel Hearne (born in London in 1745) made three voyages of exploration, under the auspices of the Hudson's Bay Company, traveling 1300 miles on foot to the Great Slave Lake. After his death appeared his *Account of a Journey from Prince of Wales's Fort in Hudson's Bay to the North-West* (1795). Alexander Mackenzie (born in Scotland about 1745) (q.v.), entering the service of the Northwest Fur Company, pushed beyond the Great Slave Lake down the river now bearing his name to the Arctic Ocean, and later crossed the Rocky Mountains to the Pacific. The narrative of these two perilous explorations was published under the title, *Voyages on the River Saint Lawrence and Through the Continent of North America to the Frozen and Pacific Oceans* (1801; reprinted, New York, 1902). After heroic efforts and a bloody conflict, the Earl of Selkirk (q.v.) established a colony in the Red River Valley, now the flourishing Province of Manitoba. While in Montreal he wrote his *Sketch of the British Fur Trade in North America* (1816). From Joseph Bouchette, the surveyor-general, came two notable topographical descriptions of the Canadas (1815-32). All these works were published in London; but by this time histories were beginning to issue from the Canadian press. We may cite William Smith's *History of Canada* (1815), and David Thompson's *War of 1812* (1832). The speeches of Joseph Howe (q.v.), delivered in the Parliament of Nova Scotia, possess rare eloquence. They were collected in 1858. As editor of the *Nova Scotian*, of Halifax, then the leading newspaper of Canada, he wrote two series of popular sketches, called "Western and Eastern Rambles" and "The Club." The former is based on observations made in travels through North America; the latter is an imitation of the *Noctes Ambrosianæ* (q.v.). To the *Nova Scotian*, Thomas Chandler Haliburton (q.v.), a native of Nova Scotia and a judge of the Supreme Court, contributed the series of humorous papers known as *The Clockmaker, or Sayings and Doings of Sam Slick of Slickville* (1835 et seq.). The hero is a Yankee peddler into whose mouth is placed much telling criticism. The sketches were widely read in America and in England, and were translated into several languages. Oddly enough, though the Canadian humorist has had few successors in his own country, he is the father of dialect humor in the United States. Haliburton also wrote the standard history of Nova Scotia, and many books descriptive of his country.

The union of Upper and Lower Canada in 1841, and the subsequent confederation of all the provinces except Newfoundland and Labrador, mark a new era for Canada. The feeling of nationality unknown in earlier times has found impassioned expression in the verse of Roberts, especially in the poem beginning, "O Child of Nations, giant-limbed!" To the new era belong the eminent statesmen Sir Charles Tupper (q.v.), Alexander Mackenzie (q.v.), Sir John Macdonald (q.v.), and Sir Wilfrid Laurier (q.v.). The constitutional questions that have come to the front since 1840 have created a press which compares favorably with that of the United States or England. Of Canadian journalists, Goldwin Smith (q.v.), who settled in Toronto in 1871, is known throughout the English-speaking world for his able work in politics and in literature. One of his best works is *The United States: An Outline of Political History* (1893). Of other miscellaneous writers it is possible to give here only a partial list. In history, where much has been well done, should be mentioned: Robert Christie's *History of Lower Canada* (6 vols., 1849-55); Alpheus Todd's *Parliamentary Government in England* (2 vols., 1867-68); J. C. Dent's *The Last Forty Years* (1881), and *The Story of the Upper Canada Rebellion* (2 vols., 1885-86); William Kingsford's *History of Canada*, the standard work (10 vols., 1887-97); James Hannay's (q.v.) *History of Acadia* (1879), and other historical works; Henry Scadding's *Toronto, Past and Present* (1884); Rev. George Bryce's *Manitoba* (1881) and *Short History of the Canadian People* (1887); G. M. Adam's (q.v.) *The Canadian Northwest* (1885); C. G. D. Roberts's (q.v.) *History of Canada* (1897); J. G. Bourinot's (q.v.) various books on Canadian history and literature, of which *Canada Under British Rule* appeared in 1900; and the publications of the Royal Society of Canada, founded in Ottawa in 1882.

The essayists and miscellaneous writers who have contributed to Canadian, American, and English periodicals, or have published books, are numerous. The range of their work may be gained from the following incomplete list: J. B. Crozier, whose *Civilization and Progress* (1885) won wide attention and secured for the author an English pension; N. F. Davin, a member of the House of Commons for Assiniboia, whose *Culture and Practical Power* was praised by Gladstone; S. E. Dawson, known for his fine study of Tennyson's *Princess* (2d ed. 1884); Sir William Dawson (q.v.), a geologist and naturalist, who has aimed in many books to reconcile science and religion; the Rev. W. H. Withrow (q.v.), author of *The Catacombs of Rome*, and other works; the Rev. G. M. Grant (q.v.), principal of Queen's College, Kingston, who has written several political and religious books, as *Our National Objects and Aims* (1890), and *The Religions of the World* (1895); T. A. Haultain, the author of literary brochures, as *A Critique of Cardinal Newman's Exposition of the Illative Sense*, and *A Christmas Chat: a Fragmentary Dialogue on Love and Religion*; J. C. Hopkins, who has written lives of Sir John Thompson, Gladstone, and Queen Victoria; W. D. LeSeur, the author of notable essays on Sainte-Beuve and Matthew Arnold; the Rev. John Maclean, whose books, as *Our Savage Folk* (1895), deal chiefly with the Indians; J. M. Oxley (q.v.), who has delighted boys with many capital sketches and stories, as *Up Among the Ice Floes* (1890), *Archie McKenzie* (1893), and *In the Swing of the Sea* (1897); and George Stewart, who has written excellently of Alcott and Emerson. Perhaps this is not the place to speak of Canada's scholars; but we should not pass without mention the well-known critical works of John Watson on Kant, Schelling, and English empirical philosophy as represented by Mill and Spencer.

In fiction Canada long lagged far behind the rest of the English-speaking world. She had her reputable poets and historians long before there appeared a novelist known beyond her borders. But toward the close of the Nineteenth Century, a school of Canadian novelists gained recognition. Naturally enough, the first Canadian novels were in imitation of Cooper. John Galt (q.v.), a Scottish novelist, who lived for three years in Ontario, where he bore a hand in founding the now flourishing city of Guelph, published, on his return home, *Lawrie Todd, or the Settlers in the Woods* (1830), giving graphic accounts of frontier life. Major John Richardson (born in Ontario of Scotch parents, in 1797) followed Galt with *Wacousta, or the Prophecy* (1833), an exciting romance based on the siege of Detroit by Pontiac. The vein worked thus early was taken up in the last quarter of the Nineteenth Century. William Kirby's (q.v.) *The Golden Dog, a Legend of Quebec* (1877), enjoyed the distinction of two translations into French and the hearty praise of Tennyson. In *The Romance of Dollard* (1889), *The Story of Tonty* (1890), and *The Lady of Fort Saint John* (1891), Mrs. Mary Catherwood (q.v.) recalled stirring episodes of Canadian history. G. M. Adam, one of the ablest of Canadian journalists, also succeeded with *An Algonquin Maiden* (1886). Life in the rural districts of Ontario has been described by Mrs. J. B. Hammond in *The Unexpected Bride* (1895); and the far-off Northwest has found its way into the *Devil's Playground* (1894) of John Mackie and the *Prairie Potpourri* (1895) of Mrs. K. E. Hayes. Canadian legends are represented by *Tales of the Soil* by Miss B. L. Macdonell, who has long been interested in the folk-lore of her country. Miss M. R. Charlton is said to have been a pioneer in the fairy tale with her *Wonder Web of Stories* (1892) and *With Printless Foot* (1894). Phases of modern life in Ottawa have been depicted by Miss K. M. Barry in *Honor Edgeworth* and *The Doctor's Daughter*. Humor, in which Canadian literature has been deficient since Haliburton, has reappeared in *The American Girl in London* of Mrs. S. J. Cotes (q.v.), and in *The Major's Big-Talk Stories* of F. B. Crofton. In the *Madonna of a Day* (1896), Miss Lily Dougall (q.v.) has drawn a portrait of the modern woman. Equally brilliant is her *Beggars All* (1891). During the last few years the tale and the short story have been cultivated by many women. Among them are Mrs. S. F. Harrison (q.v.) and Miss Robertine Barry, who have depicted the simple manners of the *habitant*; Miss J. N. McIlwraith, who has contributed sketches of life in Ontario and Quebec to various periodicals; Mrs. M. A. Sadlier, who has depicted the Irishman in *Willy Burke* and similar tales; and Miss M. M. Saunders, author of *Daisy* (1892), and *Beautiful Joe* (1894), the autobiography of a dog, which had an immense sale throughout America and England. William McLennan has contributed to *Harper's Magazine* a series of sketches of Canadian life. Interesting and well written as much of this fiction is, the one Canadian novelist who has been able to give vitality to Canadian themes is Sir Gilbert Parker (q.v.). By his *Pierre and His People* (1892), *When Valmond Came to Pontiac* (1895), *The Seats of the Mighty* (1896), and *The Right of Way* (1901), he takes rank among the most conspicuous contemporary novelists.

Except for fugitive pieces, English-Canadian verse begins with Mrs. Susannah Moodie (died 1885), a sister of Agnes Strickland, the popular historical writer. Settling in Ontario in 1832, Mrs. Moodie wrote considerable verse, some of which is to be found in the sketches entitled *Roughing It in the Bush* and *Life in the Clearings* (1853). Two themes, since often repeated, she treated beautifully in her lines on the maple and on the canoe. Contemporary with her was Charles Heavysege (q.v.), likewise born in England, who wrote a fine tragedy called *Saul* (1857). Since these two pioneers, the number of Canadian verse-writers has become very large. Rand's anthology (1900) contains 135 names. Conspicuous among the poets of the generation just past were Isabella Valancy Crawford (q.v.) and George Frederick Cameron (q.v.). The former is especially known for beautiful lyrics such as "The Master-Builder" and "The Axe of the Pioneer," and the latter for many passionate and defiant pieces like "What reck we of the creeds of men?" Archibald Lampman (q.v.), who died in 1899, was a poet of large promise. Indeed, he was compared by Howells to 'the great ones' of New England. He wrote in varied beautiful rhythms and on themes running from descriptions of external nature to an intense utterance of the great common emotions. Of living poets the best work has been done by C. G. D. Roberts (q.v.), W. W. Campbell (q.v.), Bliss Carman (q.v.), and Sir Gilbert Parker (q.v.), who are developing admirable powers of lyrical expression. Noteworthy lyrics have also been written by E. Pauline Johnson (q.v.). Among other English-Canadian poets belonging to the last part of the Nineteenth Century are Mrs. Sophie M. Almon-Hensley, John Henry Brown, Mrs. Sarah A. Curzon, F. A. Dixon, John Hunter Duvar, the Rev. A. W. H. Eaton, Mrs. S. Frances Harrison (q.v.), Joseph Howe (q.v.), William Kirby (q.v.), John T. Lespérance, William Douw Lighthall, Arthur John Lockhart, John E. Logan, Charles Mair, Thomas D'Arcy McGee, Alexander McLachlan, William McLennan, William P. McKenzie, John McPherson, T. H. Rand, John Reade, Charles Sangster (q.v.), Duncan Campbell Scott (q.v.), Frederick George Scott, Charles Dawson Shantly, Arthur Weir, and Agnes Wetherald. These are a few in the throng of late singers, celebrated by Arthur Lockhart in his *Masque of Minstrels*, who have entered the courtyard and are demanding of the herald entrance into the high hall. "Crowns," they say, "have been won and worn by others. Admit us."

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ion, edited by Lighthall, Windsor series (London, 1889); *Canadian Poems and Lays*, edited by Lighthall, in Canterbury Poets Series (London, 1891); *Younger American Poets*, edited by Sladen and Roberts (London, 1891); *Later Canadian Poems*, edited by Wetherell (Toronto, 1893); and *Chansons populaires du Canada*, edited by Gagnon (Quebec, 1865). See CANADA; AMERICAN LITERATURE; and ENGLISH LITERATURE.

CANADIAN PERIOD. See ORDOVICIAN SYSTEM.

CANADIAN POLITICAL PARTIES. See POLITICAL PARTIES, *Canada*.

CANADIAN RIVER. A river formed by the union of several branches flowing east from the Taos and Culebra range of the Rocky Mountains, at the border between New Mexico and Colorado, in longitude 105° 20′ W., and about 100 miles northeast of Santa Fé (Map: United States, Western Part, F 3). It flows nearly due south to latitude 35° 20′ N., then east across the panhandle of Texas and into Oklahoma, where at Taloga it turns southeast, forming from about longitude 97° 55′ to longitude 96° 45′ the boundary between Oklahoma and Indian Territory. It then flows through the Indian Territory toward the northeast and joins the Arkansas River, of which it is the chief tributary, at Tamaha. It is nearly 900 miles long, but, owing to closely paralleling other rivers in the lower part of its course, it drains a relatively small territory. The volume of water varies greatly in the wet and dry seasons.

CANAIGRE, kȧ-nā′gẽr (Fr.) (*Rumex hymenosepalus*). A tannin-producing plant related to the docks and quite resembling the sour dock. It grows wild in the southwestern United States. The stem is nearly smooth, often reddish in color, grows from one to three feet high, and terminates in a branched flower-stalk. The leaves vary from about 2 to 16 inches in length. The roots are tuberous, somewhat resembling small sweet potatoes, and are clustered in an upright position 3 to 12 inches below the surface of the ground. The value of the plant consists in the amount of tannin contained in the roots. The tannin content in the air-dried tubers varies from about 10 to 35 per cent., a quantity exceeding that in any other tannin-producing plant. The rapid decrease in the supply of wild canaigre has caused its culture to be undertaken during recent years in the Southwest, where some extensive plantations have been established. It is propagated mainly from the roots, one ton being required to plant an acre. The land is prepared and cultivated as for other root crops. Harvesting may begin after the plant has made its full period of growth, but it has been found that the percentage of tannin increases as the roots lie dormant in the ground. In the wild state the plant makes its growth during the winter and early spring, and by early June has seeded and the tops are dead. About fifteen tons of roots per acre is an average yield. The preparation for the market consists in slicing the roots and drying them in the sun. The extract obtained is especially adapted for tanning leather for uppers, fine saddlery, etc.

CANAL (Fr., from Lat. *canalis*, water-pipe). An artificial channel for water, constructed for drainage, irrigation, supplying water-power, or purposes of navigation. The design and construction of canals of large size are much the same whatever their purpose may be; in this article the general questions of design and construction for all kinds of canals will be discussed, but for specific examples of canals for other purposes than navigation the articles on DRAINAGE, IRRIGATION, and WATER-POWER should be consulted.

DESIGN AND CONSTRUCTION. The two points which have mainly to be considered in canal design are the cross-section of the channel and its longitudinal profile. Considering the longitudinal profile first, it will readily be understood that a canal cannot, like a road or railway, adapt itself to the irregularities of the country by means of ascending and descending grades, but must consist of one or more practically level sections or reaches. When two or more reaches are required at different levels, the adjoining extremities of two reaches cannot be, for obvious reasons, connected by a grade in the channel. The various means for making such connections are described in the following section; but the fact which needs to be noted here is that, since the profile of the canal must consist of a series of level reaches at different elevations, care has to be exercised to select a route which will provide long reaches and consequently few changes in level. As in railway work, however, depressions in the ground may be crossed by embankments or other structures upon which the channel is carried.

Another matter which has to be carefully provided for is a supply of water to the highest reach, or summit level, as it is usually called; the reason for this being that this reach is constantly losing its water to the reaches below, and this loss must be supplied by streams or reservoirs so located as to discharge into the summit level. Distances being equal, a canal which connects two points with a single reach is preferable to one with two reaches. Indeed, a considerable increase in length is allowable to permit the canal to be constructed without a change of level. The reason for this is that transferring a boat from one level to another by locks or the other usual means is a slow operation, and furthermore, locks are very expensive to construct compared with a similar length of the ordinary channel. The engineer carefully integrates these factors of time and cost and selects the route between the various points he wishes to connect which will give the minimum time of transit at the minimum cost. In deciding upon the cross-section to be given to the channel, two things have to be considered, viz. its dimensions and its form. As regards dimensions, they are determined largely by the size of the vessels with which it is proposed to navigate the canal. The width must be at least sufficient to permit two vessels of the largest size to pass each other without fouling. Another influencing factor is that the resistance to traction is greater in a restricted waterway.

It is generally assumed that a width of bottom equal to twice the beam of the largest vessel navigating the canal regularly is necessary, and that the depth of water should be about 1½ feet greater than the draught of these vessels, if good results are to be obtained. The form of the cross-section is determined very largely by the material through which the channel is cut, and by the location of the channel under certain circumstances. The bottom of the channel is always made flat; in soft ground the sides are made sloping, the angle of slope depending upon the stability of the material, being quite steep in firm materials and quite flat in unstable materials; and in rock the sides are made vertical or nearly so. The attempt is always made for the sake of economy of excavation to approach as nearly to a rectangular cross-section as the conditions will permit. When the canal passes through towns the sides are made vertical to save space and provide quays, retaining walls being used in soft ground to form vertical sides.

Canal construction consists chiefly of open-cut excavation, but embankments, aqueducts, tunnels, culverts, bridges, and a variety of other construction work are involved. The plant used and methods adopted in excavating canals depend very largely upon the size of the canal section and the material encountered. In rock the practice is the same everywhere, and consists in the use of power drills and explosives for breaking up the rock, and derricks, conveyors, and cars hauled by animal or mechanical power for removing it. In a boat canal of small section, the plant required is small and simple, but in large ship-canal sections very large and powerful machinery and elaborate power plants supplying compressed air and electricity are employed. In small canals soft-ground excavation is commonly performed by means of shovels and plows for loosening the material, and scrapers and carts for carrying it from the excavation. In larger canals this plant is increased by the addition of grading and excavating machines and steam-shovels loading into carts or cars hauled by horses or light locomotives. In ship canals of the largest section this plant is still further enlarged by the employment of special excavating and conveying machines and powerful dredges. Aqueducts are usually built in the form of masonry-arch bridges with the top formed into a channel for the water. Sometimes, however, masonry piers carry a wooden trough, or, in later years, one of steel. In embankments the channel is formed by building up the sides and lining the bottom and slopes with concrete or a layer of clay or other impervious material. Tunnels for canals are built in the same manner as tunnels for other purposes. (See TUNNELS.) Culverts are provided for carrying streams underneath the canal and bridges for carrying highways and roadways over it. See BRIDGE; CABLEWAY; CRANES; DRILLS; QUARRY.

LOCKS, INCLINES, AND LIFTS. The usual methods of transferring vessels from one level or reach of a canal to another one are by locks, inclines, or lifts. Of these three devices, the lock is the one most extensively employed. A lock is a masonry chamber built at the junction of the two reaches, the bottom of which is a continuation of the bottom of the lower reach and the top of which is at the same level as the banks of the upper reach. Structurally this chamber consists of two parallel masonry side walls, closed near each end by a pair of folding gates. When a vessel is passing from the lower reach to the upper reach through a lock, the sequence of operations is as follows: The lower gates being open and the water in the lock being at the same level as the water in the down reach, the vessel is floated into the lock-chamber and the down gates are closed. By means of valves in the upper gates or culverts in the side walls or floor of the chamber, water from the upper reach is slowly admitted until the water-levels in the chamber and in the upper reach are the same. The upper gates are then opened and the boat floated out into the upper reach to continue its journey. To lock a vessel from the upper reach to the lower reach, the operations described are merely reversed. The gates are usually made of wood or iron, and each leaf consists structurally of two vertical posts called the quoin-post and the miter-post, connected by horizontal frames, which serve as a framework for carrying the water-tight boarding or plating. The quoin-post has pivots at top and bottom which work in suitable fittings in the side wall, so that each gate-leaf swings open and shuts like a door.

A gate consists of two leaves, the swinging edges of which meet on the centre line of the chamber, but as each leaf is somewhat wider than half the width of the chamber, they do not form a straight diaphragm across the chamber when closed, but are shaped like a very flat letter V with its point projecting toward the upper level or reach. This construction gives greater strength to resist the pressure of the water. The height between the bottom of the down reach and the bottom of the upper reach is called the lift of the lock. The practicable height of lift in lock construction is limited, and where great differences in level have to be overcome, a series or flight of locks built end to end is employed. The dimensions and main structural features of the locks of several canals are given in succeeding sections.

Where a vessel passes through a lock from one level to another, a lockful of water is lost from the upper level to the lower level for each pair of boats passed. Where water is scarce and the total lift is large, therefore, resort is sometimes had to inclined planes up and down which the boats are transported in cradles or tanks running on wheels and hauled by cables or other power. Inclined planes for canals are of very early origin, being at one time quite extensively used, and some of these old inclines are described in the following section. A more important system of transferring canal-boats from one level to another is the vertical lift or lift-lock system, which has been installed in a number of places and is proposed for several other places where very high and important differences of level occur. In the vertical lift-lock system, the boat is floated into a movable trough, the ends of which are closed by gates, while similar gates close the ends of the canal approaches. When the gates are closed behind the boat the trough is raised or lowered, as the case may be, until it coincides with the other level of the canal, when the front gates are opened and the boat proceeds upon its way. The trough is raised and lowered by means of hydraulic or other power aided sometimes by counterweights or flotation tanks. The first vertical lift on a large scale was that built at Anderton, England, in 1875; a second was built at Les Fontinettes, France, in 1885; a third at La Louvière, Belgium, in 1888; and a fourth at Heinrichenberg, Germany, in 1895. In 1895 a lift lock was designed to replace the flight of locks at Lockport,

N. Y., on the Erie Canal. A summary of the essential details of the Anderton, Les Fontinettes, La Louvière, and Lockport lifts is given in the accompanying table:

HYDRAULIC LIFT LOCKS

	Anderton, England	Les Fontinettes, France	La Louvière,* Belgium	Lockport, N. Y. United States
Date of opening	1875	1885	1888	.....
Type	Hyd. ram	Hyd. ram	Hyd. ram	Hyd. balance
No. of troughs	2	2	2	2
Length of trough	75 ft.	129 ft. 7 in.	141 ft. 1 in.	225 ft.
Breadth " "	15 "	18 " 4½ "	19 " ¼ "	19 ft. 2 in.
Depth of water	5 "	6 " 10⅝ "	8 " 6 "	9 "
Height of lift	50 ft. 4 in.	43 " 1 "	50 " 6¼ "	54.43 "
Weight of boats, tons	100	300	400	300 to 400
" " trough, empty, tons	.....	.....	492	292.5
" " water in trough, tons	176	438	660	1,150
" " trough, loaded,† tons	269	879	1,161	1,442.5
Diameter of plunger.	3 ft.	6 ft. 6¾ in.	6 ft. 6¾ in.	....
Pressure on plunger, lbs. per sq. in	530	442	469	....
Excess of water to lower trough, ins	6	16	12	3
" " " " " " tons	17	98	64	35
Time of lift, mins	2½	5 to 7	2½	2
" " lockage, mins	8	20	15	15
Equivalent number of ordinary locks	6	5	...	5
Time by ordinary locks, hours	1 to 1½	2	...	½ to 1½
Cost of lifts and machinery	$147,200	$166,000	$163,000	....
" total	$242,000	$341,000	$239,000	$300,000
" of operation per week	$75	......	......	.. ...
Number of men	5	3	3	4

* There are four similar lifts on this canal, the only difference being that one of them has a lift of 63 ft. 7¾ ins.

† In the first three columns this includes the weight of the plunger.

The Heinrichenberg lift lock has a tank 229.6 × 28.2 × 8.2 feet, with a lift of 52.45 feet.

BOAT CANALS. *History.*—Canals date from a period long anterior to the Christian era and were employed as means of navigation and communication by the Assyrians, Egyptians, Hindus, and Chinese. The royal canal of Babylon was built about B.C. 600. As an interesting instance of canal construction, previous to the Fifteenth Century, may be mentioned the Grand Canal of China, built in the Thirteenth Century to connect the Yang-tse-kiang and Pei-ho. This canal is 650 miles long; is largely composed of canalized rivers: is about 5 to 6 feet deep, and has inclined planes up which the boats are hauled by capstans and made to slide down a paved track. The lock is said to have been invented in 1481 by two Italian engineers, but the merit of this invention is also claimed by Holland. The known facts are that canal locks were used in both Holland and Italy in the Fifteenth Century, and that by their development a wonderful impetus was given to canal construction, which had previously been confined to such countries as permitted canals of a single level or reach to be used. The first European country to take up the construction of navigation canals on a systematic plan and extensive scale was France. The Briare Canal, connecting the rivers Seine and Loire, was built from 1605 to 1642; the Orleans Canal was built in 1675, and the Languedoc Canal in 1666-81. For the time this last was an enormous work—the canal connecting the Bay of Biscay with the Mediterranean by an artificial waterway 148 miles long and 6½ feet deep, with 119 locks having an aggregate rise of 600 feet, and capable of floating vessels of 100 tons. In Russia, a great system of canals connecting Saint Petersburg with the Caspian Sea was developed during the Eighteenth Century; a canal connecting the North Sea and Baltic 100 miles long was finished in 1785; the Gotha Canal, 280 miles long, connecting Stockholm and Gothenburg, in Sweden, was completed in 1832; and the Danube-Main Canal, 108 miles long, was constructed 1836-46. France, however, was the Continental country which devoted the greatest attention to canal construction, taking up the development and extension of the canal system and railway system at the same time. By a law passed in 1879, France made provisions for uniformity in its canal system by establishing a depth of 6½ feet of water and locks 126½ feet long by 17 feet wide. France now has upward of 3000 miles of canal and 2000 miles of canalized rivers. The countries of Continental Europe continue to manifest considerable activity in enlarging and extending their boat-canal systems, while England and America have practically abandoned the development of their systems of navigable waterways.

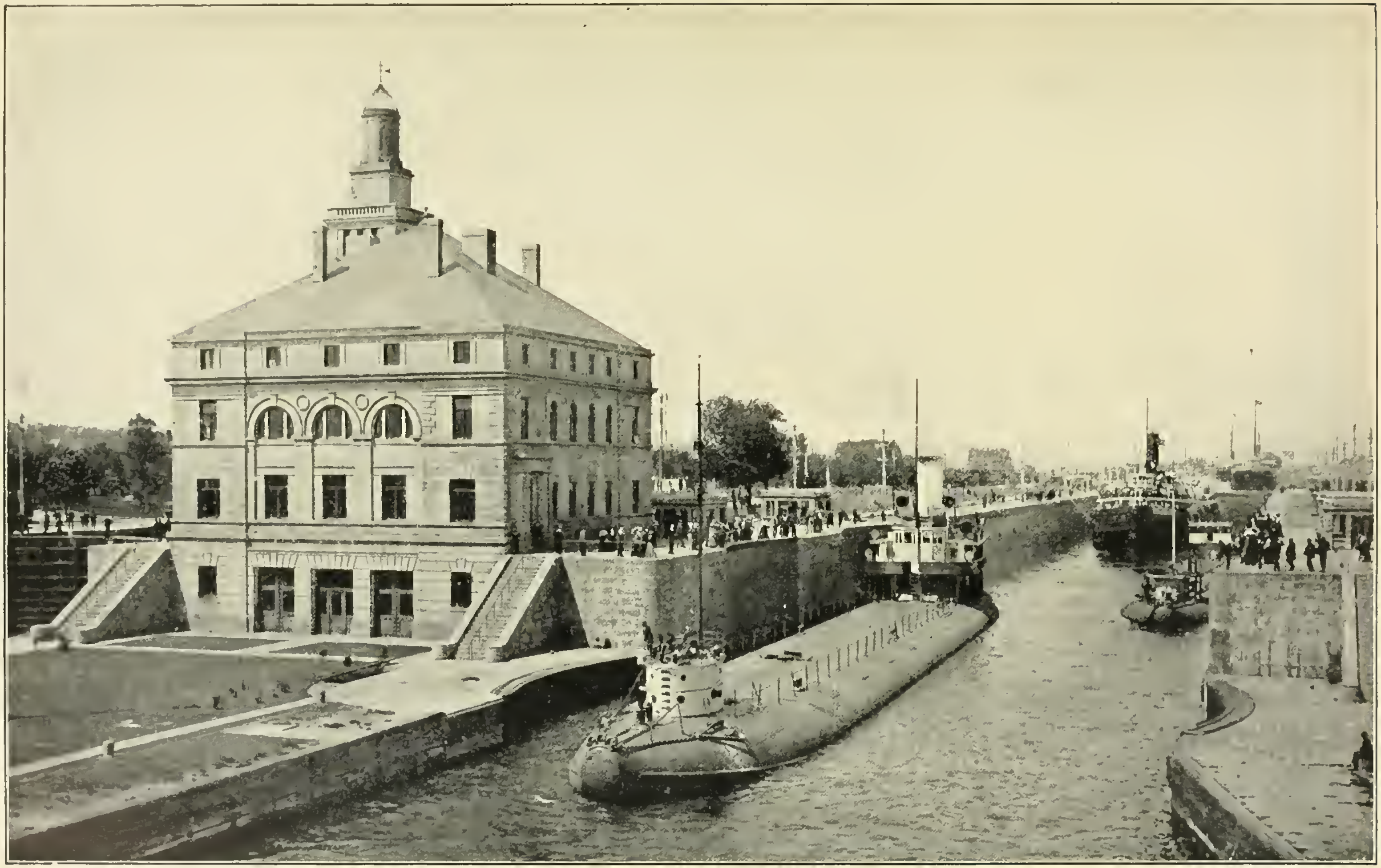
The first canals in Great Britain are generally conceded to have been the Foss dyke and Caes dyke in Lincolnshire, 11 and 40 miles long respectively, the former of which is still navigable. These channels are stated to have been first excavated by the Romans and to have been enlarged in the Twelfth Century. It was not until the latter part of the Eighteenth Century, however, that canal-building assumed importance in England through the energy and liberality of the Duke of Bridgewater and the skill of the engineer, James Brindley, the success of whose works stimulated others to engage in similar undertakings. The era of canal-building, ushered in by the Duke of Bridgewater by the construction of the Bridgewater Canal in 1761, continued until 1834, when the last inland boat canal was built in Great Britain. It is interesting to note that from 1791 to 1794 speculation in canal shares became a mania in England, and finally resulted in a financial crash and the ruin of many persons. At the end of 1834 there were about 3800 miles of canal in Great Britain, of which about 3000 miles were in England. The following may be mentioned as among the more notable of the British canals: Grand Canal, Dublin to Ballinasloe, Ireland, 164 miles long, 40 feet wide, 6 feet deep, built in 1765; Royal Canal, Dublin to Torinansburg, Ireland, built after the Grand Canal; Gloucester and Berkeley Canal, Sharpness to Gloucester, 17 miles; Caledonian Canal, crossing Scotland, 17 feet deep; Forth and Clyde Canal, 35 miles long and 10 feet deep; and the Crinan Canal across the peninsula of Kintyre, 12 feet deep. The depth of the great majority of British canals, however, varies from 3½ feet to 5 feet, and many of these are now owned by the railways.

In the United States the construction of the Erie Canal opened up the development of the canal system, which now aggregates upward of 4200 miles, located mostly in New York, Pennsylvania, Ohio, Indiana, and Virginia. The first man who really saw the future of canal communication was George Washington, whose main efforts, however, were directed toward the connection of the Chesapeake and the Ohio River. Canal-building continued active in the United States until about 1837. After this date attention was turned chiefly to railway construction. Space is not available here to trace the development of the canal system of the United States in detail, but the essential facts respecting some of the more important enterprises will be given. In 1793 a canal was built around the rapids of the Connecticut River at South Hadley, Mass., and another, 3 miles long, was built around Turners Falls on the same stream in 1790-96. The canal at South Hadley is interesting as being the first canal built in America, and as having the two levels connected by an incline, up and down which the boats were raised and lowered in a tank or caisson filled with water and propelled by cables operated by water-wheels.

The Erie Canal, connecting the Hudson River at Albany and Troy with Lake Erie at Buffalo, is 363 miles in length. It was begun in 1817 and completed in 1825, at a cost of $7,602,000. Its construction was due chiefly to the foresight and energy of De Witt Clinton. The enterprise was undertaken and carried through by the State of New York, Clinton being Governor during nearly all the period of its progress. As its route lay chiefly through an uninhabited wilderness, it opened for settlement an immense territory. It was subsequently enlarged, and is now 70 feet broad at the surface and 56 feet at the bottom, with a depth of 7 feet, except as hereafter noted. The locks, 72 in number, 57 of which are double, and 15 single, are 110 feet long and 18 feet wide. It is carried by great stone aqueducts across several streams, and in some places it is cut through solid rock. It is supplied with water from Lake Erie for 140 miles from Buffalo to Seneca River. Most of the flow of water is from the west toward the east, the only exception being between Lodi and the Seneca River, where there is a fall westward through five locks. At Rome, a little west of Utica, a supply of water is received from the Black River Canal. Between Rome and Syracuse, water is drawn from Cazenovia Lake and other reservoirs, while at Syracuse the Erie Canal supplies water to the Oswego Canal. Buffalo is 568 feet above the level of the Hudson at Albany, the difference being overcome by locks at various points. The canal has been immensely successful, contributing largely to the growth of New York, Buffalo, and intermediate places, and serving for many years as the great artery of passenger as well as freight traffic between the northeastern sections of the United States and the newly settled States of what was then the West. Light packet boats, drawn by frequent relays of horses, which were made to proceed at a trot, made the trip from Albany to Buffalo in three and a half days. In 1896 it was estimated that the cost of construction and improvements had aggregated $52,540,800. An expenditure of $9,000,000 more for enlargement was authorized by popular vote in that year. Work was begun on this enlargement in the winter of 1896-97 and resumed again during the winter of 1897-98. In the spring of 1898 all of the $9,000,000 had been consumed and only a part of the projected deepening to 9 feet was completed. No further money for continuing the work was forthcoming, and in 1900 an investigation was set on foot to determine the cost and prepare plans for a much greater enlargement which would permit the use of 1000 to 1200 ton boats.

The Illinois and Michigan Canal connects Lake Michigan and the navigable waters of the Illinois River, and allows the passage of vessels from the Gulf of Mexico to the Gulf of Saint Lawrence by using also the Welland Canal, which forms a navigable channel from Lake Erie to Lake Ontario. In 1825 it was estimated that the canal, about 100 miles in length, would cost about $700,000. In 1833 new surveys and estimates were made placing the cost of a canal 40 feet wide and 4 feet deep at $4,043,000; but nothing definite was attempted till 1836, when the plan was altered and estimates were made for a canal 60 feet wide at the bottom, and 6 feet deep, costing $8,654,000. Work was commenced in June, 1836, and continued until March, 1841, when it was discontinued for want of available funds. In 1845 an additional $1,800,000 was raised by the sale of lands owned by the canal. It must be here stated that in consequence of a change of plans the entire cost fell within the estimates which had been made, so that at the opening of the canal in April, 1848, the entire expenditure had been $6,170,226. When completed, the eastern terminus joined the south branch of the Chicago River, 5 miles from the mouth of the main stream. A direct line is pursued to the valley of the Des Plaines, the main eastern branch of the Illinois River, a distance of about 8 miles. The canal then traverses the valley to the mouth of the Kankakee River, a distance of 43 miles, passing through the towns of Lockport and Joliet, and receiving water from four feeders—the Calumet, Des Plaines, Du Page, and Kankakee rivers. The canal now follows the valley of the Illinois River to its terminus, La Salle, passing through the towns of Morris and Ottawa, receiving water from Fox River; the whole length being 96 miles. The water at La Salle is 145 feet lower than Lake Michigan, and the descent is accomplished by means of 17 locks, varying in lift from 3½ to 10 feet. The locks are 110 feet long and 18 feet wide, giving passage to boats of 150 tons.

Lake Michigan is also connected with the Mississippi by the Chicago Sanitary and Ship Canal, completed in 1900. (See Chicago Drainage Canal.) This canal, 28 miles in length, was originally designed to carry the drainage of Chicago to the Mississippi instead of to Lake Michigan. It has a minimum depth of 22 feet, a width at the bottom of 160 feet, and a width at



WEITZEL LOCK. POE LOCK.

SAINT MARY'S (Sault Sainte Marie) CANAL, Michigan. A “whaleback” steamer with tow is leaving the lock for lower lake ports.

the top varying from 162 to 290 feet. The canal extends from the Chicago River in Chicago to Lockport, where it joins the Des Plaines River. It has been proposed to deepen this canal and also the Illinois and Mississippi rivers and construct locks so that barges and light-draught vessels could pass direct from the Great Lakes to the Gulf of Mexico.

Besides the Erie and the Illinois and Michigan, the other large canals of the United States are the Delaware and Hudson (now in disuse), at one time the great coal route to New York from the Pennsylvania mines, 108 miles long, completed in 1820, cost $6,300,000; the Chesapeake and Ohio, 185 miles, cost $11,375,000; the Schuylkill Coal and Navigation Company's Canal, 108 miles, cost $13,207,000; and the Wabash and Erie in Indiana, 274 miles, cost $6,000,000. There are 13 canals in New York, 14 in Pennsylvania, 5 in Ohio, 4 in Virginia, 2 in New Jersey, and 1 each in Delaware, Maryland, Indiana, Illinois, and Michigan. The Chesapeake and Ohio Canal originated in a project formed by Washington as early as 1774, to make the Potomac navigable from tidewater to Cumberland, and to connect it by common roads and portages with the affluents of the Ohio west of the Alleghanies. The War of the Revolution postponed the scheme, but in 1784 it was again broached by Washington, and Maryland and Virginia appointed a joint commission, with him at the head, to investigate the subject. The result was the incorporation of a company to make the Potomac navigable from the tidewater to the highest possible point by the construction of such locks as might be necessary for that purpose. Of this company, Washington was the president until his election as President of the United States compelled his resignation. The project encountered many obstacles, until at last, in 1820, it was abandoned as impracticable; when the Board of Public Works of the State of Virginia took steps which led to the organization of a new company, which constructed the Chesapeake and Ohio Canal from Georgetown to Cumberland, completing it in 1850. It passes through the Potomac Valley to Paw Paw Bend, from which point it passes through the mountains by a tunnel 3118 feet long. The whole length of the canal is 184 miles, its depth 6 feet, its width to Harper's Ferry, 60 feet at the surface and 42 feet at the bottom. By means of 74 locks 100 feet long and 15 feet wide, an elevation of 609 feet is gained. All the water is supplied from the Potomac. At Georgetown the canal was led over the Potomac by means of a great wooden aqueduct bridge. The cost of the work was over $11,000,000. The Morris Canal connects the Delaware at Phillipsburg, N. J., with the Hudson at Jersey City. It is 102 miles long and accommodates vessels of 80 tons. An interesting feature of this canal is the use of inclines for connecting the different levels; there are 23 of these inclines, with an average rise of 58 feet.

The only boat canal, strictly speaking, which has been constructed in the United States since 1850 is the Illinois and Mississippi Canal, now under construction in Illinois. This canal is designed as a short route from the upper Mississippi River to Lake Michigan in connection with the existing water routes of Illinois. It extends from Hennepin, Ill., to Rock Island, Ill., 77 miles, of which 50 miles are canal and 27 miles are slack-water navigation down the Rock River. The canal proper and the summit-level feeder will be 7 feet deep and 80 feet wide at water-level. The feeder will be 34.75 miles long. There will be 37 concrete locks, 35 × 70 feet, with lifts of from 3 feet to 10 feet. Construction was begun in July, 1892, and in 1902 was in progress.

The Canadian canal system is one of the most important in the world, and comprises the Saint Lawrence and Lake Navigation, the Ottawa and Rideau Navigation, the Richelieu and Champlain Navigation, and the River Trent Navigation. Of these, the Saint Lawrence system is the most important, as it gives a 14-foot waterway from the head of Lake Superior to the Gulf of Saint Lawrence. The canals of the Saint Lawrence system are the following:

NAME OF CANAL	Length, Miles	Number of Locks	Lockage, Feet	Dist. from Prec. Canal
St. Mary's..........	0.66	1	18.	....
Welland.............	26.75	25	362.75	600 miles
Galops...............	7.625	3	15.5	226 "
Rapids Plat........	4.	2	11.5	4.5 "
Farrens Point....	0.75	1	4.	10.5 "
Cornwall.	11.5	6	48.	5. "
Soulanges.	14.	4	82.5	32.75"
Lachine.............	8.5	5	45.	15.25"

SHIP CANALS. *Examples.*—In the last half of the Nineteenth Century, with the development of steam navigation and maritime trade, a demand arose for the construction of canals of large dimensions across isthmuses to shorten the route by sea between certain countries, to connect important internal manufacturing and commercial cities with the ocean, or to afford communication between bodies of water in the interior of a continent. Among the more notable examples of such ship canals are the Suez, Corinth, Manchester, Saint Mary's, Saint Petersburg and Kronstadt, Baltic, and Amsterdam. The Suez Canal (q.v.) cuts through the Isthmus of Suez and connects the Mediterranean with the Red Sea. It is about 100 miles long, has a bottom width of 72 feet, and a depth of 26 feet, and was built 1860-69. The Manchester Canal runs from the Mersey at Eastham just above Liverpool, to Manchester, is 35.5 miles long, 26 feet deep, and has a minimum bottom width of 120 feet. It is built in four reaches connected by three sets of docks at Latchford, Islam, and Barton, the sizes of the locks of each set being 550 × 60 feet, 300 × 40 feet, and 100 × 20 feet. One of the notable structures of this canal, and the only one of its kind, is a swing aqueduct by which the Bridgewater Canal is carried over the Manchester Canal. This aqueduct opens exactly like a swing-span drawbridge to permit vessels with masts to pass through. The Corinth Canal is another of the trans-isthmian type, crossing the Isthmus of Corinth with a cut 4 miles long, 72 feet wide, and 26.5 feet deep. This canal was completed in 1893. It is stated that this canal was projected by Alexander the Great, determined upon by Julius Cæsar, and actually begun by Nero, though the work never progressed beyond a few hundred yards.

The Saint Mary's Canal, commonly known as the Sault Sainte Marie Canal, connecting the waters of Lake Superior with those of the Saint Mary's River and Lake Huron around the Saint Mary's Falls in Michigan, is but a few thousand feet long, and is chiefly remarkable for the enormous traffic and for having the largest lock in the world. This lock is of masonry, is 800 feet long, 100 feet wide, with a depth of water on the sill of 21 feet and a lift of 18 feet. The Saint Petersburg and Kronstadt Canal was completed in 1884. Owing to the bar at the mouth of the Neva, ships were not able to reach Saint Petersburg, and the canal from Kronstadt to the capital was built at a cost of $7,200,000 to overcome this barrier. It is 18.75 miles long and 22 feet deep, with a bottom width of 275 feet, except near Saint Petersburg, where it is only 207 feet. The North Sea and Baltic Canal, now known as the Kaiser Wilhelm Canal, runs from Holtenau on the Baltic to Brunsbüttel on the Elbe. It is 60 miles long, has a bottom width of 85 feet and a depth of water of 28 feet. By this canal seagoing vessels save over 200 miles in going from the Baltic to the North Sea. The Amsterdam Canal, like the Manchester, was built to connect an inland city with the sea. The total length of this canal is 16.5 miles from Amsterdam on the Zuyder Zee to the North Sea, but as the route lay through the inlet called the Y and the Wyker Meer, only 3 miles had to be excavated. This canal is 88 feet 7 inches wide on the bottom and 23 feet deep. Besides these completed ship canals, a number of others have been projected and some of them put under construction. The most notable of these are the Panama and the Nicaragua canals (qq.v.) across the Central American isthmus, and those described in the article Trans-Isthmian Canals. For descriptions of canals for other than transportation purposes, see Drainage; Irrigation; Water Supply, etc.

Haulage on Canals. The universal method of hauling boats on canals until very recent times has been animal power exerted through a towrope attachment to the boat. In China the hauling is done by men who walk along a towpath on the bank and pull the boat after them; in most other countries this work is done by horses and mules. Various attempts have been made to substitute steam-power for hauling canal-boats, and such power is considerably used, but as yet no mechanical motive power can be said to have replaced animal power. In France a system of haulage has for some time been in successful operation on which a cable extends along the bottom of the canal and traction is secured by means of a steam-engine on the canal-boat, which works a drum over which the cable is made to fall. By this system tug-boats may be employed to haul several canal-boats at a time. In recent years several experiments have been made with electric power for haulage on canals, but it has not been adopted to any extent. The remarks apply only to haulage on boat canals; the vessels using ship canals traverse them by means of their own power.

An account of the leading canals of the world, with their chief commercial and other features, will be found in the *United States Summary of Commerce and Finance*, December, 1901, and May, 1902 (Treasury Department, Washington).

CANAL DOVER. A manufacturing city in Tuscarawas County, Ohio, 75 miles south of Cleveland, on the Tuscarawas River, the Ohio Canal, and the Cleveland and Pittsburg the Cleveland, Lorain and Wheeling, and other railroads (Map: Ohio, G 4). It has coal, iron, and other mineral deposits in the vicinity, and manufactures sheet iron, steel, tin, pig iron, flour, racing wagons and sulkies, sadirons, baby-carriages, corrugated roofing, boiler-plates, etc. Settled in 1807, Canal Dover was incorporated in 1865. The government, under a charter of 1900, is vested in a mayor, elected every two years, and a city council. The municipality owns and operates the water-works. Population, in 1890, 3470; in 1900, 5422.

CANAL DU MIDI, kȧ′näl′ du mē′dē′, or Canal du Languedoc. A canal in the south of France, connecting the Mediterranean Sea and the Atlantic Ocean. It extends for 150 miles from Toulouse on the Garonne River to Cette on the Mediterranean. It is 60 feet wide, 6½ feet deep, has 114 locks, 50 aqueducts, and reaches a maximum altitude of 600 feet. It is navigable for vessels of 100 tons. It was completed in 1681 at a cost of $3,500,000.

CANALE, kȧ-nä′lȧ, Michele Giuseppe (1808-90). An Italian historian. He was born in Genoa, and through Cavour's influence secured the professorship of history and geography at the Polytechnic Institute of his native city. In 1858 he founded the Società Ligure di Storia Patria, a society to promote the study of national history. His most important publication was the *Storia della repubblica di Genova* (Vols. I.-V., 1858-74). Consult de Gubernatis, *Dictionnaire international des écrivains du jour* (Florence, 1888).

CANALETTO, kä′nȧ-lĕt′tō. The name applied to two Venetian architectural painters.—Antonio Canaletto, properly da Canal or Canale (1697-1768) was born at Venice, and, after studying with his father Bernardo and with Carlevaris, acquired in Rome a high reputation as a painter of antique ruins. Returning to Venice, he devoted himself to the Venetian scenes for which he has become justly famous. Clear in color and correct in line, he is the most important painter of the old Venetian school except Tiepolo, who often painted the figures for his landscapes. His works are found in all the principal European collections.—His nephew and pupil, Bernardo Belotto (1720-80), called Canaletto, born in Venice, also perfected himself in Rome. After laboring for some time for the Elector Charles Albert at Munich, he removed to Dresden in 1747. In 1758 he went to Vienna, and about 1770, as painter to the King, to Warsaw, where he died. His paintings, mostly views in cities in which he lived, are very numerous, especially at Dresden and Vienna. While his art is similar, it is inferior, to Antonio's. Consult Meyer, *Die beiden Canaletti* (Dresden, 1878).

CANAL RING. See New York, History; and Tilden, Samuel J.

CANANDAIGUA, kăn′an-dā′gwȧ. A village and county-seat of Ontario County, N. Y., at the northern end of Canandaigua Lake, 29 miles southeast of Rochester; on the New York Central and Northern Central railroads, and the Canandaigua Lake Steamboat Line (Map: New York, C 3). The village, a popular resort, is celebrated for picturesque scenery and handsome private residences, and contains among the more prominent features a fine court-house, Wood Library, two orphan asylums, public and private hospitals, private institutions for the aged and for the insane, Canandaigua Academy, and Granger Place School for Girls. Its manufactures include agate-ware, tinware, pressed brick, tanned leather, and malt liquors. Settled about 1789 and incorporated as a village in 1815, Canandaigua is governed under the charter of 1849 by a mayor, biennially elected, and a board of trustees. The village owns its own water-works. Population, in 1890, 5868; in 1900, 6151.

CANANDAIGUA LAKE. A lake in Ontario County and forming part of the western border of Yates County, N. Y. (Map: New York, C 3). It lies nearly north and south, is 15 miles long by nearly 2 miles wide, 668 feet above the tide, and 421 feet above Lake Ontario, into which it discharges its waters through the Canandaigua outlet, the Clyde, Seneca, and Oswego rivers. It receives its tributary waters mainly at the south end, and has its outlet at the north end. It is surrounded by high banks and furnishes charming scenery, and its steamboats are extensively patronized by pleasure-seekers.

CANANORE, kăn′ȧ-nōr′. See KANANUR.

CA′NA OF GAL′ILEE (Gk. Κανᾶ τῆς Γαλιλαίας *Kana tēs Galilaias*). A town mentioned several times in the Gospel of John. Here Jesus performed His first miracle, the changing of water into wine (John ii. 1, 12). He visited it again later in His ministry (John iv. 46). It was the home of one of His early disciples, Nathanael (John xxi. 2). The site is not certainly known. By some it has been located at Khirbet Kana, about 8 miles north of Nazareth, near the plain of Asochis (Sahel el Buttauf). By others it has been identified with Kefr Kennah, about 4 miles northeast of Nazareth, on the road to Tiberias.

CANARD, kȧ-närd′ *or* kȧ-när′ (Fr., a hoax, cheat, literally a duck). An absurd and sensational story. The origin of this application of the word *canard* (duck) is uncertain. Some derive it from the old phrase *vendeur de canard à moitié*, literally 'one who sells half a duck,' that is, pretends to sell a duck, but cheats during the transaction: while others attribute its origin to the following marvelous tale circulated by Cornelissen in order to try the gullibility of the public: Having at one time twenty ducks in his possession, he killed them one by one and gave their bodies to the diminishing number of survivors, who successively devoured them, until one out of the twenty was all that remained, and he had actually eaten his nineteen comrades. A corresponding expression in the United States is the term *roorback*, a fictitious narrative published for purposes of political advantage. It originated in 1844 from a story of some notoriety purporting to be an extract from the *Travels of Baron Roorbach*.

CANARESE, kăn′ȧ-rēz′. See KANARESE.

CANARI, kȧ-nä′rē. An ancient tribe about the Gulf of Guayaquil, Ecuador, conquered and incorporated by the Incas, about 1450. They were skillful metal-workers, their technique differing from that of the Quichua. Copper axes, curiously ornamented, are found in their tombs, sometimes as much as 500 pounds weight in a single deposit. Some of the most beautiful gold ornaments of the Andean region have also been found in their territory. Their linguistic connection is unknown.

CANARIE, kȧ′nȧ′rē′. A dance, now obsolete, supposed to have come from the Canary Islands. Two persons danced before each other with extravagant gestures. It was a favorite dance in France in the time of Louis XIV., and it is mentioned by Shakespeare. The canarie is a species of gigue resembling the *loure*, only quicker in tempo.

CANA′RIUM (Neo-Lat., from East Indian *canari*, from *Kanara*, or *Canara*, a district of southwestern India). A genus of trees of the order Burseraceæ, the species of which are natives of the southeastern parts of Asia, the Malayan archipelago, Australia, etc. The fruit is a drupe. The kernel of the fruit of *Canarium commune* is eaten both raw and roasted, and in Amboyna bread is made of it. An oil is expressed from it, which is used both for table purposes and for lamps. The tree is about 50 feet high and has a bark which yields a heavy oil that has the same properties as balsam copaiva and may be substituted for it. *Canarium sylvestre* also produces eatable kernels. The timber of this species is hard, tough, and close-grained, and is used for furniture. *Canarium commune* is supposed to be one of the trees which yield the resin called elemi, and *Canarium strictum* is a large tree in Bombay and Madras, where it grows at elevations up to 4500 feet. The foliage is very brilliant and attractive. From the trunk a gum exudes, the black dammar of commerce. It solidifies upon the tree into black lumps, but is amber-colored by transmitted light. *Canarium Australianum* furnishes a timber valuable in finishing houses.

CANA′RY (named after the Canary Islands). A small finch (*Carduelis Canaria*), a native of the Canary Islands, Madeira, and the Cape Verde, but introduced into Europe as a cage-bird in the latter part of the Fifteenth or early in the Sixteenth Century, and now found, as a captive, in all parts of the world where Europeans have gone. So popular has the canary become as a cage-bird, on account of its power of song and its gentle manners, that the breeding of canaries for the market is not only a popular avocation in some places, but even an important industry. In the wild state the plumage is dull greenish, streaked with darker shades, like a siskin (q.v.), and the yellow, orange, or red shades of the domesticated birds are entirely the result of man's artificial selection. The size of the canary, as well as its color, has been profoundly modified by domestication, and some varieties are half as large again as the wild bird, which is rather more than 5 inches in length. The musical powers of the bird have also been considerably modified, and there is much variety in the different breeds in this particular, but it is doubtful whether in power and clearness the domestic birds are the equal of those which are wild. In their native haunts canaries frequent the vicinity of houses, build their nests of moss, hair, grass, feathers, etc., in bushes or trees, and raise two or more broods in the season. The eggs are four or five in a set, and are pale blue, generally unspotted. The birds feed chiefly upon seeds, especially of certain grasses, but they also eat soft green leaves, buds, and occasionally insects.

The breeding and training of canaries is a subject of much interest and no little importance. It has been carried on most extensively in northern England, Scotland, Belgium, and especially in the Harz Mountains in Germany. The various breeds of canaries take their names in part from the locality where bred, and in part from some characteristic of the breed which is specially notable. There are a large number of varieties, of which the following are the most important. To begin with the British breeds, the Norwich canary is famous for the beauty of its plumage, but not for its great powers of song. It is an inferior singer compared to other breeds, especially some of the Harz Mountain birds. The Norwich canary is often crested, a pleasing addition to its appearance. The Manchester canaries are also notable, particularly the Manchester coppy, which is the giant of canaries, sometimes reaching a length of 8 inches. They are not, however, remarkable songsters. Among the more curious breeds are the Yorkshire Don and Scotch Fancy, which are very slender, with long neck, trunk, and tail, gracefully curved, so that in extreme examples the bird is almost a half-circle. Among the handsomest breeds are the gold and silver 'spangled' canaries, which, as their names imply, are not uniformly colored, but have a comparatively dull ground color, spangled with very bright or very pale feathers. These breeds are more valuable as ornaments than as musicians. The Belgian canaries are also bred especially for appearance, and some of them are almost monstrosities. The most notable of these is the variety known as 'humped-backs,' which have a small head, very short neck and broad shoulders, a combination that gives a very odd appearance. They are usually yellow, but the color is a secondary matter. The Harz Mountain canaries are the most famous of all, and are especially noted for their powers of song. The color is regarded as of much less importance, and consequently they vary much from bright green to clear yellow. The best of all singers are the Saint Andreasberg canaries, and the choicest of these command a large price. Individual birds, with exceptional ability as singers, are used as instructors for young birds, and are known as 'campaninis.' There are two other breeds of canaries not confined to any special locality, but which take their names from their color. The most interesting of these are the natural *cinnamons*, which are deep brownish-yellow or reddish, and are often very beautiful. The others are known as *cayennes*, and are reddish, a color produced by judicious feeding of red pepper to the growing birds. They are sometimes nearly scarlet, and often handsome birds, but breeders of cinnamons regard them as an abomination.

The price of a canary depends upon its approach to the ideal bird of its breed, but the females are usually the cheaper. From $1 to $75 is the range of value for the great majority of canaries, but exceptional individuals may bring as high as $150. The highest prices are paid for the Saint Andreasberg campaninis. Canaries are often crossed, by fanciers, with other finches, and the hybrids thus produced are sometimes valuable as cage-birds, either for appearance or peculiar qualities of song.

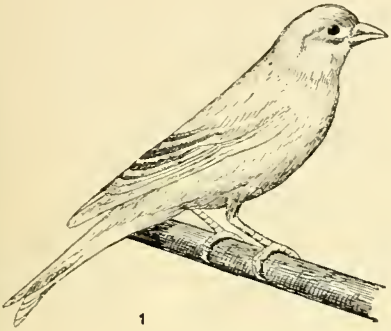
These hybrids are called 'mules,' and are usually the result of mating other cock birds with hen canaries, on account of the difficulty of persuading female linnets, goldfinches, etc., to sit on their eggs in captivity.

Canaries are the easiest of cage-birds to care for, as almost the only essentials are cleanliness, food, and water. The cage and especially the food and water vessels should be kept scrupulously clean. A bath should be provided at least once a week, and occasional freedom from the cage in a closed room is a real benefit to the bird. Care should be taken not to expose the bird to cold draughts, hence it is usually unwise to hang the cage near windows during wintry weather. The principal articles of food should be canary-grass seed, hemp-seed, and rape, but green leaves, such as chickweed, are necessary to maintain perfect health. Sugar is also greatly enjoyed by canaries, and is a proper food in small quantities; but acids, such as fresh apple, should be avoided. Lime is essential to the bird's welfare, and is best provided in the form of cuttle-fish bone. The nails are apt to grow so long, in canaries kept in small cages, that they should be cut occasionally to prevent them from becoming troublesome to the bird. For further information in reference to the care of canaries and their breeding, consult: Wallace, *The Canary Book* (London, 1893); Holden, *Canaries and Cage-birds* (New York, 1883), and Belts, *The Pleasurable Art of Breeding Pet Canaries* (London, 1897). See CAGE-BIRDS, and Plate of CANARIES.

CANARY-GRASS (*Phalaris canariensis*). An annual grass of which the seed is much used, under the name canary-seed, as food for cage-birds, and which is, on that account, cultivated to some extent in the south of Europe, and in certain districts of Germany and England. It is a native of the Canary Islands, the south of Europe, north of Africa, and Asia. It has been introduced and has become naturalized in England and various parts of the United States. It attains a height of 2 or 3 feet, and has a crowded, egg-shaped, spike-like panicle, from an inch to almost 2 inches long. A fine flour is prepared from canary-seed, which is employed as glue or sizing in fine cotton-weaving, and for the finishing of silken stuffs. The groats and flour of this small kind of grain are also used in the Canary Islands, in Barbary, and in Italy, as food, the flour being made into bread, which is very nutritious and pleasant. Other closely allied species of Phalaris produce a similar grain, but are inferior in productiveness and quality. Reed canary-grass (*Phalaris arundinacea*) is very common on the banks of lakes and rivers, and in other wet places in Great Britain, throughout southern and central Europe, and in the United States. It differs very much in appearance from canary-grass, having a large, spreading panicle, generally of a reddish color, and the glumes are winged at the keel. It is a somewhat reed-like grass, 4 to 6 feet high, with creeping roots, which help to secure river-banks, and yields a great bulk of hay, but has been very generally despised as a coarse grass. However, it is said to be very nutritious, and is readily eaten by both horses and cattle when cut early. A variety with curiously white-striped leaves is well known in gardens as ribbon grass. Southern canary-grass (*Phalaris Caroliniana*), and its variety, Angusta, range from South Carolina to Florida, and westward through Texas to California and Oregon. The variety is called Apache timothy, from the resemblance the head bears to that of timothy. It is valued for forage on account of its remaining green throughout most of the winter. For illustration, see Plate of CAMELLIAS.

CANARY ISLANDS, or CANA'RIES (Lat. *Canaria*, from *canis*, dog, perhaps because of the

CANARY BIRDS



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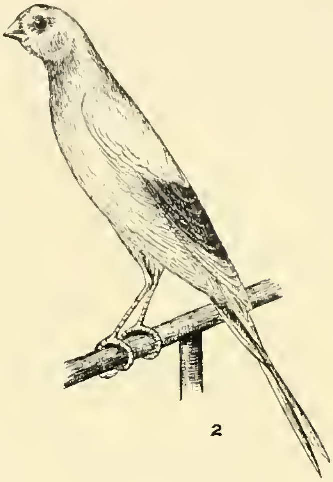

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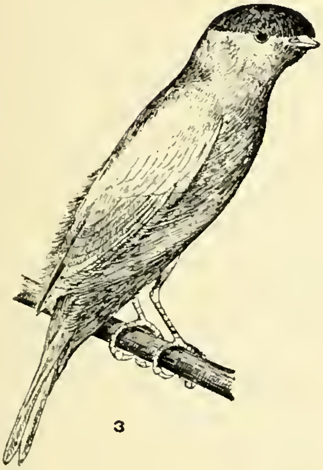

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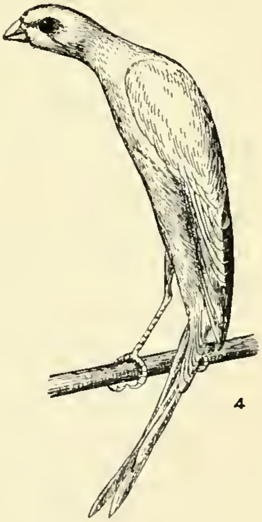

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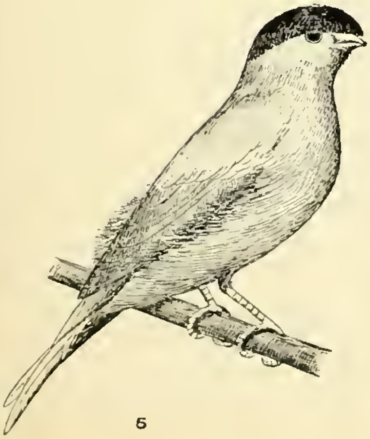

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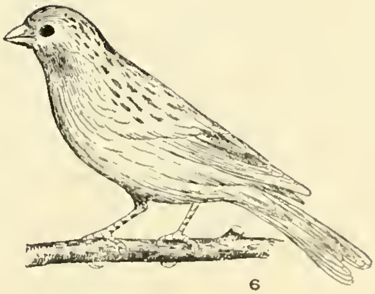


6

1. GOLDFINCH MULE (Canary and goldfinch).
2. YORKSHIRE DON.
3. MANCHESTER COPPY.
4. SCOTCH FANCY CANARY.
5. NORWICH CRESTED CANARY.
6. WILD CANARY.

shape of the largest island). A group of islands in the Atlantic, off the northwestern coast of Africa, constituting a province of Spain (Map: Africa, C 2). They extend from about latitude 27° 40′ to 29° 25′ N., and from longitude 13° 25′ to 18° 16′ W., forming a land area of 2808 square miles. The group consists of the seven large inhabited islands, Teneriffe (752 square miles), Gran Canaria (531 square miles), Palma (280 square miles), Gomera (144 square miles), Ferro or Hierro (107 square miles, the smallest of the large islands), Fuerteventura (665 square miles) and Lanzarote (326 square miles), and six islets. The entire group is of volcanic origin, and there are extinct volcanoes on all the islands. The volcanoes of Pico de Teyde on Teneriffe and the Mountain of Fire on Lanzarote are but slumbering. The former, the loftiest mountain of the Canaries, often called the Peak of Teneriffe, rises to a height of 12,190 feet.

The climate is generally mild and healthful. The average temperature for the year is about 65°, while the maximum and minimum are about 80° and 52° respectively. Precipitation is very scant and occurs mainly in winter; droughts are frequent. The hot east and southeast winds blowing from Africa dry up the vegetation. There are several zones of vegetation depending on the altitude, but in general the west slopes furnish a more abundant vegetation than those on the east. The vegetation of the lowest zone, extending up to 1200 and 1300 feet, is more or less African, and includes the date palm, sugar-cane, the dragon's-blood tree, etc. In the second zone, between 1200 and 2800 feet, the flora resembles that of southern Europe, and comprises the vine, the olive, the orange, and several kinds of European grain. In the third zone the vegetation is confined mostly to trees, and includes the *Pinus canariensis*, evergreens, the *Retama blanca*, and a few other coniferæ. The native fauna offers little variety, and most of the animals have been imported either from Europe or Africa. The two easternmost islands, Fuerteventura and Lanzarote, possess a richer vegetation and are better wooded than the others.

The chief agricultural products are fruits, onions, and potatoes, which are exported to the West Indies. The production of wine was formerly of considerable importance, but is at present in a state of decline. The land is held mostly in large estates and the peasants are generally very poor and emigrate in considerable numbers to Cuba and to the other West Indian islands. The Canaries were formerly of great commercial importance through the production of cochineal, but this industry has declined greatly. Tobacco, sugar, and silk are raised only in insignificant quantities. The manufacturing industries are of little account and are confined chiefly to the production of some silk and cotton fabrics and coarse linen. The commerce is largely with Great Britain and Spain. Inter-insular communication is maintained by means of sailing vessels, and communication with Europe is effected by mail steamers. For administrative purposes the group is divided into seven districts. There is a Spanish garrison and a native militia. The towns of Santa Cruz de Teneriffe (the capital) and Ciudad de las Palmas are fortified. The population of the group was 334,521 in 1897.

The Canaries are regarded as the *Fortunatæ Insulæ* of the ancients, and are supposed to have been known to the Phœnicians and the Carthaginians, judging from the description by Juba II., King of Mauritania. Before their annexation to Spain they were inhabited by the Guanchos, a Berber tribe, now completely amalgamated with the Spanish settlers. Their discovery by Europeans in modern times dates from the Fourteenth Century, when a vessel was accidentally driven on the islands. In 1344 they were granted by the Pope to Luis de la Cerda, who, however, did not take possession of them. They were subsequently granted by Henry III. of Castile to Robert of Bracamonte, and it was only in the beginning of the Fifteenth Century that an attempt was made to take possession of them. In 1402-05 Jean de Bêthencourt, a French adventurer, to whom Robert of Bracamonte had transferred his title, conquered several of the islands, and by the end of the century the entire group was in the possession of Spain, Teneriffe, the largest, having been taken in 1496. Consult Brown, *Madeira and the Canary Islands* (London, 1894).

CANARY-SEED. See CANARY-GRASS.

CANARY WINE. A wine which is also known as Teneriffe, from one of the Canary Islands bearing that name, produced in these islands, and resembling Madeira. The name is applied properly only to the Bidogne wine, and must be distinguished from the Malvoisie of the Canaries, made from the Malvasia sweet grape. It is made from grapes gathered before they have ripened, and when new is crude and unpleasant; but in the course of two or three years, increasing in mildness with age, it becomes so much like Madeira that it is often sold for it. Like Madeira, it is greatly improved by a voyage to the tropics.

CANAS'TER (Lat. *canistrum*, from Gk. *κάναστρον*, *kanastron*, wicker basket). A rush basket used in Spanish America to hold tobacco; hence is said to be derived the name 'canaster,' applied to tobacco of a certain kind.

CAN'BY, EDWARD RICHARD SPRIGG (1819-73). An American soldier. He was born in Kentucky, early removed with his parents to Indiana, graduated at West Point in 1839, and served as second lieutenant in the Seminole War from 1839 to 1842, and as captain in the Mexican War in 1846-47, being brevetted major during the latter war for "gallant and meritorious conduct in the battles of Contreras and Churubusco," and lieutenant-colonel for "gallant conduct at Belen Gate." He then served as assistant adjutant-general of the Pacific Division from 1849 to 1851, and in the adjutant-general's office from 1851 to 1855; participated in the Utah expedition of 1857-60, and commanded the Navajo expedition of 1860-61. During the Civil War he commanded the Department of New Mexico from June, 1861, to September, 1862, successfully defending his territory from the attacks of the Confederate general Sibley; was raised to the rank of brigadier-general of volunteers in March, 1862; was in command of the Draft Rendezvous at Pittsburg from November, 1862, to January, 1863; was then assigned to special duty at the War Department; commanded the city and harbor of New York at the time of the Draft Riots (q.v.) in 1863; became a major-general of volunteers in May, 1864, and subsequently commanded the military division of West Mississippi from May, 1864, to June, 1865, directing, as such, the Mobile campaign of March-April, 1865, which resulted in the occupation of Mobile and Montgomery. In May, 1865, he received the surrender of the Confederate forces under Generals R. Taylor and E. K. Smith. At the close of the war he was brevetted brigadier-general in the regular army for "gallant and meritorious services at the battle of Valverde, N. M.," and major-general for "gallant and meritorious services in the capture of Fort Blakely and Mobile, Ala." In July, 1866, he was promoted to the regular rank of brigadier-general, subsequently commanded various military divisions and departments, and on April 11, 1873, while commanding the Division of the Pacific, was treacherously killed by the Modoc Indians while holding a conference with them near the 'Lava Beds' in Oregon.

CANBY, William Marriott (1831—). An American botanist, born in Philadelphia, and educated mainly in private schools. Although in business, he devoted much time to the study of botany, and described many new species of plants. He made large collections in the United States and Canada, and was one of the botanists of the Northern Pacific Transcontinental Survey. His activity in botanical research has included the collection, through purchase, exchange, and gift, of a fine herbarium of more than 30,000 species of plants, now the property of the College of Pharmacy in New York City, and a smaller collection made for the Society of Natural History of Delaware.

CANCALE, käɴ'kål'. The capital of a canton in the Department of Ille-et-Vilaine, France, situated on a height overlooking the Bay of Mont Saint-Michel, 10 miles east of Saint Malo. It is a favorite seaside resort and a busy fishing port. Oyster-culture is an important industry, 430 acres of beds devoted to their propagation being inclosed by the Rocher de Cancale, an islet which also protects a safe harbor. Population, in 1901, of town, 3678; of commune, 6549.

CAN'CAN (Fr., origin obscure; OF. *caquehan*, tumultuous assembly, noise, quarrel. Romance scholars derive it from the disputes of the mediæval schoolmen over the pronunciation of the Lat. *quamquam*, *quanquam*, although the word may be purely onomatopoetic). A wild dance, or rather a series of violent choreographic movements, originated by the demi-monde of Paris. There is some resemblance between it and the Bacchic or Dionysian dances of ancient Greece.

CANCAO, kän'kou', **KANG-KAO,** or Hatien. A seaport of Cambodia, situated on the Gulf of Siam at the mouth of the river Cancao, on the frontier between Cambodia and Cochin China (Map: Siam, E 5). The harbor is shallow, and the trade, once considerable, is now in a state of decline.

CANCELING (Lat. *cancelli*, lattice-work). The extinguishment of the rights or obligations created by a written instrument by obliterating or destroying the instrument itself. Originally the efficacy of the act depended on a strict compliance with the prescribed form of drawing transverse lines over the face of the document; but at the present time any mark or writing—as the word 'canceled' indorsed on the back thereof—clearly showing the intention of the parties is equally valid. In general, the destruction, obliteration, or marking of an instrument creating property rights, whether accidentally or with the intention of canceling it, will not have the legal effect of extinguishing the rights or obligations created by it. Thus, the destruction of a deed by which real property has been conveyed will not operate to divest the title of the grantee and revest it in the grantor. The title, having passed by the deed, can be restored to the former owner only by another deed. So the tearing or obliterating of a written lease by the parties thereto will not have the effect of terminating the subsisting relation of landlord and tenant, as this can only be effected by a surrender made in writing or otherwise, as prescribed by law. The only exception to this rule is when the cancellation of an instrument—as a deed or letters patent—is ordered by a court or other competent authority for fraud or mistake, or because the instrument—a mortgage, for example—has answered its purpose and is entitled to be discharged. The case of a will, which may be canceled by the maker at his pleasure, is not a real exception to the rule, as a will does not go into effect and create property rights until the death of the testator. See Letters Patent; Fraud; Mistake; Will.

Instruments creating mere contract rights, whether under seal or not—as written agreements for services or for the sale of goods, notes, and bills of exchange, and the like—may, on the other hand, usually be canceled by the parties thereto. Even where such contracts are required by law to be in writing, they are capable of being revoked by parol; and the cancellation of the instrument operates as a revocation or rescission of the contract, if made with that intention. Bonds were, and, to a certain extent, still are, instruments of a peculiar nature, and are considered as comprehending within themselves all of the rights and obligations described in them. Even the accidental loss or destruction of such an instrument rendered it unenforceable at common law. While this is generally no longer true, it may always be extinguished by cancellation. See Contract; Bond; Deed; and compare Alteration and Spoliation.

CANCELLATION (Lat. *cancellare*, to make like lattice, to strike out lattice-wise (×), to cross out, cancel). The process of rejecting a common factor from both dividend and divisor, or a common term from both members of an equation. In reducing fractions any factor common to both numerator and denominator is rejected by cancellation; e.g.

$$\frac{6}{8}=\frac{2\cdot 3}{2\cdot 4}=\frac{3}{4}$$

Algebraic expressions are often simplified on the same principle; e.g.

$$\frac{a^3-b^3}{m+n}\cdot\frac{m^2-n^2}{a-b}=\frac{(a-b)\,(a^2+ab+b^2)}{m+n}$$

$$\frac{(m+n)\ \ (m-n)}{a-b}=(a^2+ab+b^2)\ \ (m-n)$$

The plan, formerly followed in text-books, of treating cancellation as an independent chapter of elementary arithmetic, has, in recent years, been abolished.

CANCELLERIA, kän-chä'lå-rē'ä. PALAZZO DELLA. A Renaissance palace in Rome, the masterpiece of Bramante. It was built in 1489 for Cardinal Riario, and is connected with the Church of San Lorenzo in Damaso, built on the site of the Basilica of Damasus I. The chief feature of the palace is the graceful court with a double row of red Egyptian granite pillars, removed by Damasus from Pompey's Theatre to his basilica and thence to the palace.

CANCER. See TUMOR.

CANCER (Lat., crab). The fourth of the twelve signs of the zodiac, running from 90° to 120° on the ecliptic (q.v.). The constellation Cancer contains the interesting cluster called Præsepe, which has been carefully measured very recently at Göttingen with the heliometer, and photographically at Columbia University, New York. See PRECESSION; ZODIAC.

CANCER, TROPIC OF. See TROPICS.

CANCER-ROOT, or BEECH-DROPS (*Epiphegus virginiana*). A parasitic plant of the order Orobanchaceæ. It is a native of North America, growing almost exclusively on the roots of beech-trees. Like all the other plants of its order, it has a curious appearance, having scales instead of leaves. Its stem is branching, and produces distant alternate white flowers, streaked with purple. The whole plant is powerfully astringent, and the root is brownish, spongy, very bitter, and nauseous in taste. This plant at one time had quite a reputation as a cure for cancer, and, in conjunction with white oxide of arsenic, is believed to have formed a medicine once famous in the United States under the name of 'Martin's Cancer Powder.' Another American plant, the Indian pipe (*Monotropa uniflora*), is sometimes also called cancer-root, and is used in the same way; and an infusion of the common broom-rape (*Orobanche major*), a native of Great Britain and of the south of Europe, parasitic on the roots of broom, furze, and other leguminous plants, has been employed as a detergent application to foul sores. The attachment of the cancer-root to the roots of the beech-tree is said to be a case of the intervention of mycorrhiza or fungus filaments penetrating and investing both roots. Through these connections the parasite gains its sustenance. Being without functional leaves, it cannot make its own food. (See BROOM-RAPE.) For illustration, see colored Plate of PARASITIC PLANTS.

CANCRIN, kän-krēn', GEORG, Count (1774-1845). A Russian statesman. He was born at Hanau, Germany, and studied law and political economy at Giessen and Marburg. He then went to Russia, where his father was director of the salt-mines of Staraya Russa, was first employed by him and then in the Ministry of the Interior. He subsequently entered the army, and attracted attention by his writings on military subjects. In 1812 he was appointed commissary-general of all the forces, and in 1814 accompanied the Czar Alexander I. to Paris. He was Minister of Finance from 1823 until 1844. In some respects he gave a great stimulus to the national industries, and by his financial management brought order into the financial chaos, but the unlimited issue of paper money sanctioned by him paved the way for subsequent financial disaster. His chief works are: *International Wealth, National Wealth, and Political Economy* (1821); and *The Economy of Human Societies* (1845).

CAN'CRUM O'RIS (Neo-Lat., from Lat. *cancer*, cancer + *oris*, Lat. gen. sing. of *os*, mouth), NOMA, or GANGRENOUS STOMATITIS. A gangrenous process which usually begins on the gums or cheek in children, following an exhausting disease such as measles. It is very rare, and is caused by streptococci, the bacteria of pus, acting upon tissues of low vitality. It is also found attacking the ear and the female genitals. The gangrene spreads rapidly, invades the surrounding tissues, and causes death in 75 per cent. of cases. In those in which it is not fatal, a line of demarcation appears, a slough separates, and granulation occurs. Among the symptoms of cancrum oris may be mentioned: profound prostration; a temperature of 102° to 105° F.; dullness, apathy, and diarrhœa. There is little pain. Patients suffering from the affection should in all cases be isolated. The mouth should be carefully disinfected with peroxide of hydrogen or with a weak solution of potassium permanganate, and supporting and stimulating food and medicine should be given. Surgical treatment, if at all employed, consists in making a thorough excision of the diseased tissue and cauterizing, or else applying nitric acid.

CANDABA, kän-dä'bå. A town of Luzon, Philippines, in the Province of Pampanga. It lies 20 miles from Bacolor, the capital of the province, and west of the Pinag de Candaba, an inland marsh of considerable size. The town was founded in 1578. Population, in 1898, 14,585.

CANDACE, kăn'då-sē. The name of two or more queens of Ethiopia (q.v.)—i.e. Nubia—in Roman times. According to Pliny, Candace was the usual name for Ethiopian queens, or, rather, for the mother of the King. Two Candaces are known to history. One, a one-eyed virago, attempted to invade Egypt in B.C. 22, but the Roman governor, Petronius, defeated her and penetrated to her capital, Napata (q.v.), which he destroyed. Another Candace, who seems to have been a contemporary of Nero, is mentioned in Acts viii. 27 et seq., where it is stated that her treasurer was converted by Philip. Her residence was at Meroë.

CANDAHAR, kän'då-här'. See KANDAHAR.

CANDAULES, kăn-da̤'lēz. See GYGES.

CANDEISH, kän-dāsh'. See KHANDESH.

CAN'DELA'BRUM (Lat., from *candela*, a candle). A word signifying properly a candlestick, but frequently employed to mean a support for a lamp. The candelabra proper were of sufficient height to stand upon the floor, and though the forms vary greatly in details, the general shape is well defined. Those from Etruria have a base, usually formed of three feet of some animal, from which rises a slender shaft, often crowned by a statuette. Near the top four arms branch, terminating in spikes on which the candles were placed. A metal disk below the arms protected the hand, if it were needful to move the candelabrum. This pattern was easily modified to serve as a support for the small hand lamps, sometimes by placing flat plates on the top of the shaft and ends of the arms, sometimes by suspending the lamps by chains from the branches. Many bronze candelabra have been found in Etruria, Herculaneum, and Pompeii, showing great skill in the elaboration of the details. Among the most splendid examples are the great marble candelabra which seem to have been placed in temples or palaces. These show a marble base, often richly decorated, from which rises a columnar shaft usually ending in a hollow, which may have served for oil or incense. Similar marble bases for the support of bronze candelabra are by no means infrequent. Examples of candelabra may be found in the plates of the *Museo Gregoriano*, or in the works of Overbeck, *Pompeii in seinen Gebäuden, Alterthümern und Kunstwerken* (4th ed., Leipzig, 1884); Mau-Kelsey, *Pompeii: Its Life and Art* (New York, 1889).

CAN′DIA. See CRETE.

CANDIA, or MEGALOKASTRON. Formerly the capital of Candia or Crete, on the north shore of the island, latitude 35° 20′ N. and longitude 25° 9′ E. It is surrounded by fortifications built by the Venetians, but which are now out of repair. The town has been much injured by earthquakes. Candia occupies the site of the ancient Heracleum, the seaport of Cnosus. The present city was founded by the Saracens in the Ninth Century, was fortified in the Twelfth Century by the Genoese, and greatly strengthened by the Venetians in the following three centuries. It was taken by the Turks in 1669, after a stubborn defense by the Venetians, who lost 30,000 men. Population, in 1900, 22,331.

CANDIDATE (Lat. *candidatus*, dressed in the white toga, *toga candida*). In ancient Rome, an aspirant to one of the higher magistracies, as consul, tribune, ædile, or prætor. He was so called because of the white garment in which he appeared in public during the period of his candidature. His dress was chosen partly as an ostentation of humility, and partly as the means of displaying wounds received in battle. The candidature commonly lasted two years; in the first year, the candidate was tested by the Senate, whose decision, if favorable, was ratified by the popular assemblies; and in the second his name was entered in the list of candidates. During this period occurred the *ambitio*, or canvassing of voters, which often gave occasion to enormous bribery, in spite of the severe enactments passed to prevent the corruption of the electors. The elected candidate was styled designatus.

In the early Christian Church newly baptized converts were styled candidates, on account of the white garments worn during the eight days after baptism. In modern times a German probationer or theological student who has been approved before the highest ecclesiastical authorities is called a candidate; but a still broader signification is, in English-speaking lands, also attached to the word—an applicant for any office whatever, religious or secular, being termed a candidate.

CANDIDE, OU L'OPTIMISME, käɴ′dēd′ o͞o lôp′tē′mē′z'm (Lat. *candidus*, shining). A pessimistic novel by Voltaire (1759), so named from its philosophic hero, Candide.

CAN′DIDUS, WILLIAM (1840—). An American singer, born in Philadelphia, Pa. During the Civil War he attained the rank of major of Federal artillery. He studied for the opera under Konapazeck in Berlin and Rouchetti in Milan, and became, in 1880, a member of the opera of Frankfort-on-the-Main. He was also connected with the American Opera Company.

CANDLE (Lat. *candela*, from *candere*, to be white, glow). A cylinder of wax or fatty matter, with a wick, intended for giving light. Candles are made of tallow, the solid portion of palm and cocoanut oils, bleached wax, spermaceti, and paraffin, and other oily substances found in coal, shale, and gas tar. They are either dipped, molded, or rolled. 'Dips' are made by stretching a number of wicks upon a suitable frame, so that they may hang down at a distance from each other equal to about double the intended thickness of the candle; these are then dipped in a trough of melted tallow and hung upon a rack until cooled, then dipped again and again, until the required thickness is obtained. The dipper has a number of frames prepared before commencing the operation, and by the time he has dipped the last the first is cool enough to dip again. The tallow in the trough has to be kept only a little above its melting-point, for if it were much hotter it would melt away a portion of the tallow already on the wick, instead of adding to it. Molds, or mold candles, are made by pouring the tallow into a metal tube, along the axis of which the wick has been previously fixed. These tubes are well polished in the inside, and several are fitted in a frame, the upper part of which forms a trough, into which the molds all open. Thus, by pouring into the trough, all the molds are filled at once. Some process of molding is now used in the manufacture of candles of all materials except those of wax, and machines are employed.

Wax candles are not molded, on account of the great amount of contraction which wax undergoes on cooling, and the difficulty of removing it from the molds. The wicks are warmed and suspended over a basin of melted wax, which is poured over them until they acquire the proper thickness; they are then rolled, while hot, between two flat pieces of smooth, hard wood, kept moist to prevent adhesion. Pure stearic acid, or stearin, the chief fatty acid of tallow so largely used for candles, is a hard, crystalline substance, perfectly dry and free from any greasiness, with a somewhat pearly lustre. Its crystalline structure presents a difficulty in the manufacture of candles, for when cast in molds it contracts on cooling, and leaves small spaces between the crystals. This has been obviated by mixing the stearin with a little wax or paraffin and pouring into hot molds.

Paraffin (q.v.), a white, crystalline body, obtained by distillation from cannel coal, etc., affords a beautiful white and clear material for candles, and having thus, in a great degree, the properties of wax at a much smaller expense, it is much used for this purpose. *Ozocerite* (q.v.) is another oily mineral substance used for candles. For candles as standards of illumination, see PHOTOMETRY.

To obviate the necessity of snuffing candles, several devices have been adopted. In all of them the object is effected by causing the wick to bend over and its end to fall outside of the flame: and thus, by coming in contact with the oxygen of the air, to be completely burned—for such combustion cannot take place within the flames.

For the use and signification of candles in religious worship, see LIGHTS, USE OF, IN PUBLIC WORSHIP.

CANDLE, ELECTRIC. See ELECTRIC LIGHTING.

CANDLEBERRY, BAYBERRY, WAX-MYRTLE, or TALLOW-TREE (*Myrica cerifera*). A small tree or shrub 4 to 18 feet high, but generally a low-spreading shrub, a native of the eastern coast region of the United States, but most abundant and luxurious in the South. It belongs to the order Myricaceæ, distinguished by naked flowers, a drupaceous fruit (stone-fruit)—the scales becoming fleshy—and a single seed. The candleberry has evergreen, oblong, lanceolate leaves, with two small serratures on each side at the point, sprinkled with resinous dots. The bark and leaves when bruised emit a delightful fragrance. The small, dry drupes or nuts when ripe are covered with a greenish-white wax, which is collected by boiling them and skimming it off, and is afterwards melted and refined. A bushel of berries will yield four or five pounds. It is used chiefly for candles, which burn slowly, with little smoke, and emit an agreeable, balsamic odor, but do not give a strong light. An excellent scented soap is made from it. *Myrica gale* is the sweet gale of the moors and bogs of Scotland, well known for its delightful fragrance, a native of the northern parts of the world. Several species are found at the Cape of Good Hope, one of which, *Myrica cordifolia*, bears the name of wax-shrub, and candles are made from its berries. *Myrica nagi*, a Japanese species, is a tree from 40 to 50 feet high that will withstand some frost. It produces an edible fruit, and is cultivated to some extent in California. *Myrica asplenifolia*, or *Comptonia asplenifolia*, is common in the United States, where it is known as sweet-fern.

CANDLE-FISH, or EULACHON or OOLACHAN. (1) A fish (*Thaleichthys Pacificus*) of the smelt family (Argentinidæ), nearly allied to the caplin (q.v.), and found on the Pacific Coast of America from Oregon northward. (For illustration, see WHITEFISH, etc.) It is 12 to 15 inches in length, has a somewhat pointed and conical head, and a large mouth. The color is greenish-olive on the back, passing into silvery-white on the sides and belly, sparsely spotted with dirty yellow. The flesh is very oily, but the oil has a fine flavor. It is an excellent pan-fish, its flesh being far superior to that of the trout. Its oil is sometimes extracted and used as a substitute for cod-liver oil. The Alaskan Indians often use the dried fish as a lamp, by merely drawing through it a piece of rush pith or a strip from the inner bark of the cypress-tree as a wick. Immense shoals of candle-fish approach the shores and mouths of streams in spring and summer, when they are taken in large quantities by the Indians in canoes, by means of a flattened pole 8 to 12 feet long, having teeth originally of sharpened bone, but now of iron, set thickly along the edge of its outer end. This is swept through the school of fish, pricking and catching many, which are then skillfully tossed into the boat. The Indians formerly made extensive use of the oil rudely compressed from these fishes. Consult Swan, in *Proceedings United States National Museum*, Vol. III. (Washington, 1881).

(2) A local name in San Francisco for the Pacific coalfish (*Anoploma fimbriata*).

CANDLEMAS (Engl. *candle* + *mass*). In its ecclesiastical meaning, the feast of the purification of the Virgin Mary, observed on the second of February. This festival is very strictly kept by the Roman Catholic Church, there being a procession with many lighted candles, and those required for the service of the ensuing year being also on that occasion consecrated; hence the name Candlemas Day. In Scotland this day is one of the four term days appointed for periodical annual payments of money, interest, taxes, etc., and of entry to premises, the three other term days there being Whitsunday, Lammas, and Martinmas. See TERM.

An old document of the time of Henry VIII., preserved in the archives of the Society of Antiquaries, London, concerning the rites and ceremonies in the English Church, speaks thus of the custom of carrying candles: "On Candlemas daye it shall be declared that the bearyinge of candles is done in the memorie of Christe, the spirituall lyghte whom Simeon dyd prophecye ['a light to lighten the Gentiles'], as it is redde in the churche that daye." But an older and heathen origin is ascribed to the practice. The Romans were in the habit of burning candles on this day to the goddess Februa, the mother of Mars; and Pope Sergius, seeing it would be useless to prohibit a practice of so long standing, turned it to Christian account by enjoining a similar offering of candles to the Virgin. The candles were supposed to have the effect of frightening the devil and all evil spirits away from the persons who carried them, or from the houses in which they were placed. An order of council in 1584 prohibited the ceremony in England. There is a tradition in most parts of Europe to the effect that a fine Candlemas portends a severe winter. In Scotland the prognostication is expressed in the following distich:

"If Candlemas is fair and clear,
There 'll be twa winters in the year."

Christ's Presentation, the Holiday of Saint Simeon, and, in the north of England, the Wives' Feast Day, were names given to Candlemas Day. Consult Brand, *Popular Antiquities*, Bohn's edition (London, 1849).

CANDLE-NUT (*Aleurites triloba*). A tree of the order Euphorbiaceæ, a native of the South Sea Islands, Madagascar, Molucca, Java, etc., which produces a nut with a very hard shell and a kernel good to eat when roasted, although in a raw state it possesses in a slight degree some of the active properties so common in the Euphorbiaceæ, and is apt to cause purging. It is about as large as a walnut. An excellent fixed oil is procured from it, used both for food and as a lamp-oil. It is a drying oil, and has been used by artists. It is known as country walnut-oil and kekune-oil. A valuable dye is obtained from the fruit. The inhabitants of the Society Islands, after slightly baking these nuts in an oven and removing the shell, string them on rushes to be used for torches, which are made by inclosing four or five strings in a leaf of the screw-pine (Pandanus). The lampblack used in tattooing was obtained from the shell of the candle-nut. A gummy substance exudes from the candle-nut tree, which the South Sea Islanders chew. The candle-nut tree has been grown in Florida and California. *Aleurites cordata*, a species from the south of China, yields an excellent lac.

CAND'LISH, Robert Smith (1806-73). A founder and leader of the Free Church of Scotland. He was born in Edinburgh, studied in Glasgow, was licensed in 1828, and from 1834 until his death was minister of Saint George's, Edinburgh. In the General Assembly of 1839 he strongly declared in favor of the Free Church party of the Established Church, and in 1843 took a leading part in the formation of the independent body. From the death of Chalmers (1847), his activity and eloquence made him the controlling spirit of the Free Church. He declined an appointment as professor of divinity at New College, but in 1862 accepted the principalship of that institution. He improved the Free Church school system, and aided in forming the Evangelical Alliance (1845). His publications include: *Contributions Towards the Exposition of the Book of Genesis* (1842); *On the Atonement* (1845); *Examination of Mr. Maurice's Theological Essays* (1854); *Reason and Revelation* (1859); *The Two Great Commandments* (1860); and a posthumous volume of *Sermons* (1874).

CANDOLLE, käɴ'dōl', De. See De Candolle.

CANDON, kän-dōn'. A town of Luzon, Philippines, in the Province of Ilocos Sur. It is situated 29 miles south of Vigan, near the coast, on which it has a port, and contains a telegraph station. The town dates from 1591. Population, in 1898, 15,797.

CAN'DOUR, Mrs. A member of the *School for Scandal* in Sheridan's comedy of the latter title. Under the guise of a well-meaning frankness she is able to exceed even Backbite and Crabtree in acidity of speech.

CAN'DUC (N. African). A South African jackal. See Jackal.

CANDY. See Confectionery.

CAN'DYS (Gk. κάνδυς). A loose gown, worn by the Medes and Persians as well as the later Parthians over their other garments. It was a long flowing robe made of woolen cloth, which was either purple or of some other brilliant color, and had wide sleeves. In the sculptures at Persepolis, nearly all the personages are represented as so attired.

CANDYTUFT (Eng. *Candy*, archaic name for the island of Crete + *tuft*) (*Iberis*). A genus of plants of the order Cruciferæ. The species are chiefly found in the countries surrounding the Mediterranean Sea, and the name candytuft is supposed to be derived from that of the island of Candia, the name *Iberis* from Iberia (Spain). One species, *Iberis amara*, remarkable for its bitterness, is a doubtful native of England. Some species are slightly shrubby, some are herbaceous perennials, some annuals. Candytuft is among the most familiar ornaments of our flower-gardens, as the annual white and purple candytuft (*Iberis umbellata*), the sweet-scented candytuft (*Iberis odorata*), and two slightly shrubby species, *Iberis sempervirens* and *Iberis semperflorens*, the latter of which, in sufficiently warm situations, continues to blossom throughout the whole winter, and is prized for the abundance and the perfect whiteness of its flowers. There are about a dozen well-known species of Iberis, all of which are represented in gardens by numerous cultural varieties.

CANE, or **KEN**, kän. A river rising in Bundelkhand, India, near latitude 23° 54′ N., and longitude 80° 13′ E., and after a north-northeast course of 230 miles entering the Jumna in latitude 25° 47′ N., and longitude 80° 35′ E. (Map: India, C 4). It is generally too rapid and rugged for navigation, but during the rainy season is navigable from Banda, 30 miles above its confluence. It is remarkable for the matchless beauty of its pebbles.

CANEA, kä-nē'å, or **KHANIA**. The chief commercial town of Crete, and capital of a province (Map: Greece, E 6). It is situated on the northern coast, and occupies the site of ancient Cydonia. The present city is of Venetian origin, and dates from A.D. 1252, when a colony was sent from Venice to occupy it. The object of its foundation was to keep down the Greeks, who had been in arms, and at open war with their Italian lords, almost without intermission from the day when the Venetians first set foot on their shores. Venetian coats of arms are still observed over the doorways of some of the principal houses. Canea is surrounded by a strong wall and deep ditch, both of which, however, are in a state of great dilapidation; it has a good but very shallow harbor. Canea exports to France and Italy oil, soap, wax, etc. The population in 1900 was 21,025.

CANEBRAKE. A dense growth of *Arundinaria macrosperma*, a large kind of reed or grass, indigenous to the warmer parts of the United States. It grows in marshy situations, where it attains a height of 10 to 30 feet. It is of a genus allied to the bamboo (q.v.). The flowers are in panicles. The young growth of this cane is used as fodder, but the quality is rather poor. The stems supply fishing-rods, pipestems, splints for baskets, chair-bottoms, mats, etc. *Arundinaria tecta*, a related species, by some considered a variety, is smaller and more hardy. It is found as far north as Maryland and southern Illinois.

CANE DELLA SCALA, kä'nå dĕl'lå skä'lå. See Scala.

CANEL'LA (Neo-Lat., from Med. Lat. *canella*, cinnamon) (*Canella alba*, or *Canella Winterana*). A small tree common in the West Indies, and in the south of Florida, where it is often called wild cinnamon. The fruit is a small black berry. The whole tree is very aromatic, and its flowers are extremely fragrant. The bark of the young branches is the *Canella bark* of apothecaries, also known in commerce as whitewood bark, and sometimes called white cinnamon. It forms a considerable article of export from the Bahamas. It has an aromatic fragrance, regarded as intermediate between that of cinnamon and that of cloves, and bitterish, acrid, pungent taste. It is employed as a stomachic and stimulant tonic, and as an aromatic addition to tonics or to purgatives, in debilitated conditions of the digestive organs.

CANEPH'ORI (Lat., from Gk. *κανηφόροι*, *kanēphoroi*, basket-bearers, from Gk. *κανεον*, *kaneon*, basket of cane + *φερειν*, *pherein*, to bear). Girls of Athens annually selected from the highest families to walk in the Panathenaic and other festival processions, carrying on their heads baskets containing the implements and apparatus necessary for a sacrifice. Their graceful attitudes (which may be seen on the friezes of the Parthenon in the British Museum) suggested subjects for sculpture to some of the great artists of Greece. Similar statues are also used in architecture to support light entablatures, and are sometimes identified with caryatides.

CANE-SUGAR. See Sugars.

CA'NES VENAT'ICI (Lat., hunting-dogs). A constellation of the northern hemisphere, added by Hevelius, and known generally as the greyhounds of Hevelius. The dogs are distinguished by the names of Asterion and Chara. On the celestial globe they are represented as being held in leash by Boötes, and apparently pursuing Ursa Major (q.v.) round the pole of the heavens.

CAÑETE, kȧ-nyā'tȧ, Manuel (1822-91). A Spanish poet, dramatic writer, and critic, born in Seville. His works include his lyrics *Poesías* (1859), which possess the pathetic quality of the verses of the old Sevilian school, but are marred by their unnatural and declamatory tone; and a number of dramas, which have received high praise: *Un rebato en Granada* (1845); *El duque de Alba* (1845); and *La esperanza de la patria* (with Tamayo). He is celebrated chiefly, however, as a dramatic critic. In this capacity he published, among other works, editions of the *Farsas y églogas* of Lúcas Fernandez (1867); of *La tragedia llamada Josefina* (1870); *Teatro español del siglo XVI.* (1885); and *Escritores españoles é hispano-americanos* (1884).

CANEY, kä'nȧ, El. See El Caney.

CAN'FIELD, James Hulme (1847—). An American educator. He was born at Delaware, Ohio, graduated in 1868 at Williams College, and in 1872 was admitted to the bar of Michigan. He practiced law from 1872 to 1877, was a professor at the University of Kansas from 1877 to 1891, and in 1891 became chancellor of the University of Nebraska. From 1895 to 1899 he was president of the Ohio State University, and in the latter year was appointed librarian of Columbia University, New York. His publications include *Taxation: A Plain Talk for Plain People* (1883); *A Short History of Kansas* (1885); *Local Government in Kansas* (1887); and *The College Student and His Problems* (1901).

CANG, CANGUE, or Kea. An instrument of degrading punishment in use in China. It consists of a large wooden collar fitting close round the neck, the weight of which is usually from 50 to 60 pounds. Over the parts where the cang fastens are pasted slips of paper, on which the mandarin places his seal, so that the culprit may not be relieved until the full term of his sentence has expired, which sometimes extends to fifteen days. On the cang is also inscribed, in large letters, the offense and the duration of the punishment. The criminal, having been paraded through the streets by the police, is then left exposed in some thoroughfare of the city. As he is incapable of using his hands, he has to be fed during the time he is suffering the penalty.

CANGA ARGUELLES, käṉ'gȧ är-gā'lyȧs, José (1770-1843). A Spanish statesman. He was an active opponent of Napoleon and an energetic member of the Cortes of 1812, but on the return of the Bourbons was exiled. Under the restoration of the Constitution of 1812 in 1820, he was made Minister of Finance, and in this position effected many reforms. He resigned in 1821. After the overthrow of the Constitution in 1823 he went to England, but returned to Spain in 1829, and was appointed keeper of the archives at Simancas. He was the author of *Elementos de la ciencia de hacienda* (1825); *Diccionario de hacienda* (1827); and *Observaciones sobre la guerra de la Península* (5 vols., 1833-36).

CÁNGAS DE ONIS, käṉ'gȧs dȧ ô-nēs'. A town of Spain, in the Province of Oviedo, 35 miles east of the city of Oviedo. It is known chiefly for its connection with the famous Pelayo (q.v.), and the reconquest of Spain from the Moors. There are interesting churches in this vicinity, one containing the tomb of Alfonso I. Inscriptions and remains of bridges indicate that Cángas de Onis was of some importance under the Romans, but its identity has not been fixed. Population, in 1900 (commune), 8559.

CÁNGAS DE TINEO, käṉ'gȧs dȧ tē-nā'ō. A town of northern Spain, in the Province of Oviedo, on the Rio Narcea, 37 miles southwest of Oviedo (Map: Spain, B 1). It is surrounded by high hills and possesses an interesting bridge. Though the adjacent region is rough and mountainous, it is well watered, and agriculture and stock-raising are carried on. There are manufactures of liquors, flour, and linen and woolen goods. Population, in 1900 (commune), 23,658.

CANGE, känzh, Du. See Du Cange.

CANGIAGI, kȧn-jä'jē, or **CAMBIASO**, kȧm-byä'sô, Luigi. See Cambiaso, Luca.

CAN GRANDE DELLA SCALA, kȧn grän'dȧ dĕl'lȧ skä'lȧ. See Scala.

CANICATTI, kä'nē-kät'tē. A city in Sicily, 28 miles north of Licata, in a rocky valley 1500 feet above the sea (Map: Italy, H 10). It has a technical school, and the country produces grain, wine, and fruit, and contains sulphur-mines. Population (commune), in 1881, 20,000; in 1901, 24,564.

CANICHANA, kä'nē-chä'nȧ. A tribe residing upon the Mamoré River, Bolivia, between 13° and 11° south. They were formerly savage and brutal cannibals living in fortified villages, from which they made constant raids upon their more peaceable neighbors. Notwithstanding their savage character they willingly accepted the Jesuit missionaries, and are now gathered into mission villages. Their language has no known affinities.

CANIC'ULA (Lat. *canicularis*, from *caniculus*, little dog), Canicular Days, or Dog-days, Canicular Year. Canicula was an old name of the constellation Canis Minor (q.v.); it was also used to denote Sirius, or the dog-star, the largest and brightest of all the stars, and which is situated in the mouth of Canis Major (q.v.). From the heliacal rising (q.v.) of this star (Sirius) the ancients reckoned their dog-days, or *dies caniculares*, which were 40 in number—20 before and 20 after the rising of the star. The rising of the dog-star was supposed to be the occasion of the extreme heat and the diseases incidental to these days. It was by mere accident that the rising of the star coincided with the hottest season of the year, in the times and countries of the old astronomers. The time of its rising depends on the latitude of the place, and is later and later every year in all latitudes, owing to precession. In time, the star may rise in the dead of winter. The canicular year was that known among the Egyptians and Ethiopians. It was computed from one heliacal rising of Sirius to the next, and consisted ordinarily of 365 days, and every fourth year of 366. This year is sometimes called the heliacal year. The reason for computing the year from the rising of Sirius seems to have been that, at the time, the heliacal rising coincided with the greatest swelling of the Nile.

CAN'IDÆ (Neo-Lat., from Lat. *canis*, dog). A family of carnivores, the dog tribe, now usually classified between the hyenas and the bears. Their whole organization fits them to be less exclusively carnivorous than the feline tribe. They have generally three incisors or cutting teeth, with one large canine tooth, and four premolars on each side of the jaw, two true molars on each side in the upper jaw, and three in the lower. The true molars are adapted for crushing either bones or vegetable food. The last premolars in the upper jaw are remarkably large, and particularly adapted for cutting flesh. The legs are comparatively long, the claws are non-retractile, and with one exception (Lycaon), the toes are five in front and four behind. The thumb is small and considerably above the other digits. The muzzle is long, the ears generally erect and pointed, and the tail more or less bushy. A peculiarity of the dogs is their habit of association in packs and of pursuing their prey mainly by scent. In this sense they are extremely keen, they have good eyesight and hearing, and most of them are diurnal. They frequent open uplands, by preference, some climbing trees, and, though mostly good swimmers, they avoid aquatic pursuits. Most of them occupy dens or burrows, often dug by themselves, and sometimes placed in groups. See Dog; Fennec; Fox; Fox-Dog; Jackal; Hunting Dog; Wolf, etc.

CANID'IA. The name under which Horace reproaches a former mistress, Gratidia, who proved unfaithful to him. He immortalized her in an ode beginning "Oh, stay, Canidia, spare thy rites of sorcery," in which she is described as a magic-making hag.

CANID'IUS. A lieutenant-general of Antony's army, in Shakespeare's *Antony and Cleopatra*. He surrenders his legions and his services to Cæsar on hearing of the result of the sea-fight at Actium, since "six kings (had) already shown him the way of yielding."

CANINA, kȧ-nē'nȧ, Luigi (1795-1856). An Italian architect and archæologist, born in Casale. He was professor of architecture in Turin and superintended the excavation of the Tusculum in 1839, and of the Appian Way in 1848. He wrote many works on ancient architecture and on Etruscan and Roman archæology, among which are *L'architettura antica descritta e dimostrata col monumenti* (1839-46); *Antica Etruria marittima* (1846-51); and *Storia e topografia de Roma antica* (1839-48), and published a number of plans and maps of his discoveries.

CANINES, kā'nīnz, or Canine Teeth. See Teeth.

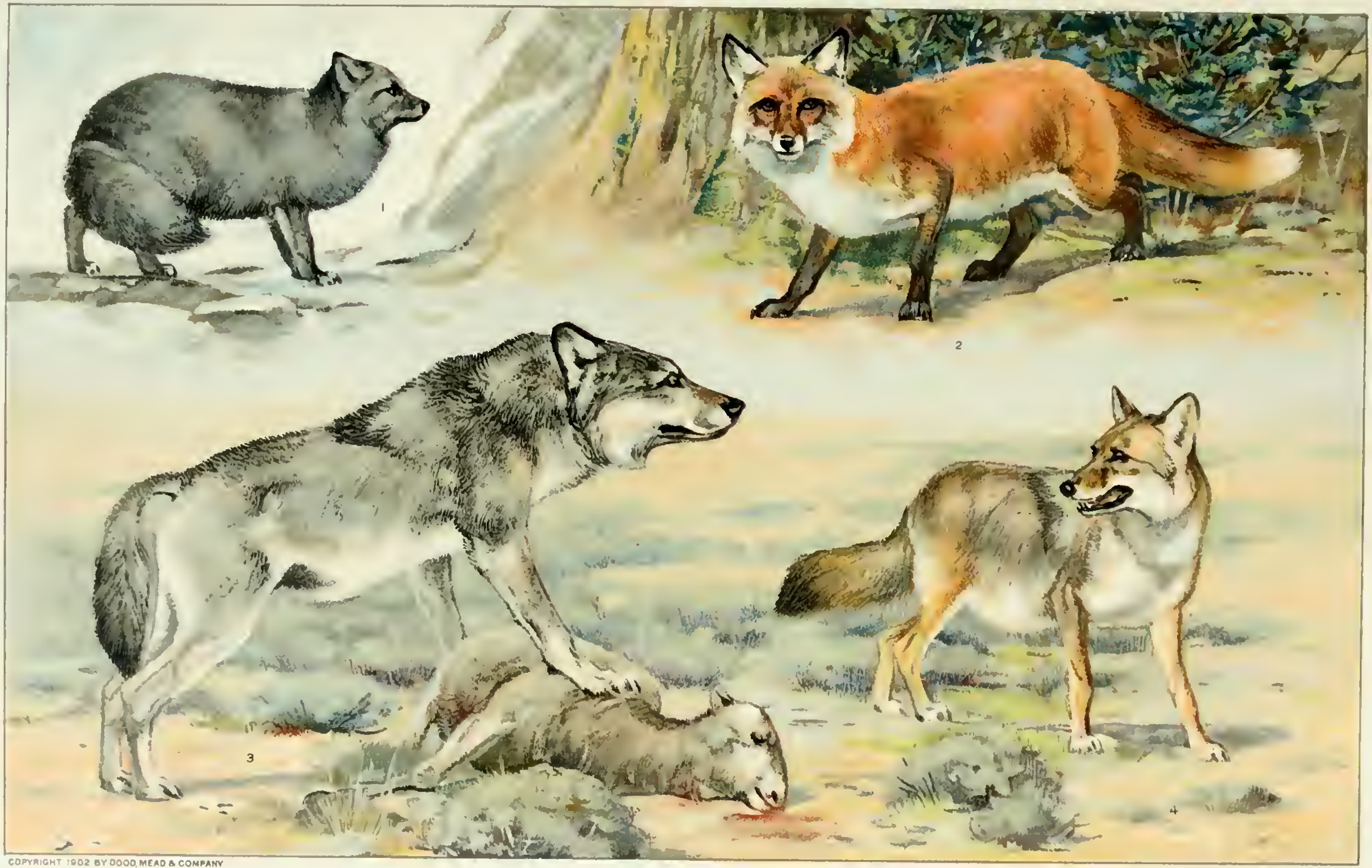
CANINI, kȧ-nē'nē, Marco Antonio (1822-91). An Italian publicist and poet, born in Venice. He was for a time employed in the printing-office of the *Gondoliere*, upon the *Biblioteca Classica*, edited by Carrer. Resuming his legal studies in Padua, he became involved in political troubles and fled to Tuscany in 1847, and his subsequent share in the disturbances of 1849 in Venice and Rome forced him to seek safety in Greece and the East. *Mente, fantasia e cuore*, a volume of poems, appeared in Athens in 1852. For a while he wrote articles for the Rumanian papers, till an attack upon Napoleon III. caused his expulsion from Bucharest. Returning to Italy, he was appointed by Rattazzi secret political agent in the East, and at the same time entered into an understanding with Kossuth to form a league of the countries in the Danubian region. In 1866 he joined the army of Garibaldi and afterwards went to France, but in 1873 returned to Italy. In 1876 he agitated in behalf of the Servians, and accompanied the Russian Army in the Russo-Turkish War of 1877-78 as a newspaper correspondent. His works embrace a wide variety of topics, including a novel in verse entitled *Giorgio il monaco e Leila* (1872); *Sonetti* (1873); *Odi Saffiche* (1879); *La questione dell' Epiro* (1879); *La verità sulla questione degli Israeliti in Rumania* (1879); *Amore e dolore* (1880); and *Il libro dell' amore* (1886-87), a collection of love poems translated from all the principal languages of Europe. The most interesting portion of his adventurous life is told in an autobiographic volume, *Vingt ans d'exil*.

CANISIUS, kȧ-nĭsh'ĭ-ŭs, Petrus (a Latin translation of his Dutch name, De Hond) (1521-97). A Jesuit theologian who took a prominent part in the Council of Trent. He was born in Nimeguen, May 8, 1521, and was educated in Cologne and Louvain. He was the first German to join the Jesuit Order (1543); became professor of theology in Ingolstadt, 1549; was preacher to Ferdinand I. in Vienna, and became the first provincial of the Jesuits in Germany (1556). He established colleges of the order in Prague, Freiburg (Switzerland), Augsburg, and Dillingen, and powerfully contributed to the check of the spread of Protestantism which the Counter-Reformation effected. To this end he drew up, in 1554, in Latin, a catechism which should take the same place as Luther's; it has been very widely used, has passed through more than 400 editions, and has been translated into French, German, and English. He died in Freiburg, Switzerland, December 21, 1597, and was beatified in 1864. For his life, consult: Reiss (Freiburg, 1865); P. Drews (Halle, 1892); J. B. Mehler (Berlin, 1897); L. Michel (Lille, 1898); and A. Kross, *Canisius in Oesterreich* (Vienna, 1898); also, his *Epistulæ et Acta*, ed. O. Braunsberger (8 vols., Freiburg, 1896, et seq.).

CA'NIS MA'JOR (Lat., the Greater Dog). A constellation of the Southern Hemisphere, below the feet of Orion. It contains Sirius, the brightest of all the stars, and its place may be found by means of this star, which is on the continuation of the line through the belt of Orion.

CA'NIS MI'NOR (Lat., the Lesser Dog). A constellation of the Southern Hemisphere. It

DOG FAMILY · CANIDÆ



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1 BLUE FOX - VULPES LAGOPUS (SUMMER COAT)
2 RED FOX VULPES VULGARIS
3 GRAY WOLF CANIS GRISEUS
4 COYOTE - CANIS LATRANS

ABOUT 1/10 NATURAL SIZE

is near Canis Major and just below Gemini. Procyon, of the first magnitude, is its principal star, and lies in a direct line between Sirius and Pollux, so that the position of the constellation may be found by means of this star.

CANISTER (Lat. *canistrum*, reed basket, Gk. *κάνιστρον*, *kanistron*, wicker basket, from *κάννα*, *kanna*, reed). A form of projectile. For smoothbore guns and for the earlier rifles, canister consisted of a cylindrical tin or sheet-iron case filled with small cast-iron balls half an inch to one inch in diameter. The ends were usually wooden disks over which the tin or iron was crimped and tacked down; the interstices between the balls were either filled with sawdust or like material, or the balls were sunk in holes in soft wooden disks, which were piled one upon the other. Canister is little used in modern high-power guns, but there is now a tendency toward supplying it for the close-range operations of gunboats in rivers and contracted waters, as well as for field pieces. See ARTILLERY; FIELD ARTILLERY; GUNS, NAVAL; PROJECTILES; SHRAPNEL; ORDNANCE, etc.

CANITZ, kä'nits, FRIEDRICH RUDOLF LUDWIG, Baron von (1654-99). A Prussian poet and statesman. He was born in Berlin, and belonged to an ancient Brandenburg family. In 1697 he was made councilor of State; in 1698, a baron; and, after serving in various diplomatic missions, was Minister Plenipotentiary to The Hague during the formation of the Grand Alliance (q.v., and see SUCCESSION WARS). His poems, consisting of odes, satires, and elegies, in imitation of Boileau, were published after his death by J. Lange, under the title of *Nebenstunden unterschiedener Gedichte* (1700, without the author's name; with Canitz's name, 1719). Although cold and without originality, his verses had the merit of being simple and natural, and thus assisted in the reaction against the bombast prevalent among his contemporaries. His most popular poem is his elegy written on the death of his wife, Dorothea or Doris von Arnim, who died in 1695. Consult: König, *Des Freiherrn von Canitz Gedichte*, with a biographical sketch (Leipzig, 1727); selections from his works in the *Bibliothek deutscher Dichter des 17. Jahrhunderts*, Vol. XIV. (Leipzig, 1838); Varnhagen von Ense, *Biographische Denkmale*, Vol. IV. (Berlin, 1824-45); and Lutz, *Canitz und sein Verhältnis zu dem französischen Klassicismus* (Munich, 1887).

CANKER (Lat. *cancer*, cancer). A disease affecting the hoof of a horse. An obstinate inflammation of the frog and sole of the foot of the horse may follow an attack of thrush. This malady occurs in two different forms — in the acute stage, when the malady is chiefly local; and in the chronic stage, when the constitution suffers, and all local remedies fail to restore a healthy function of the structures of the foot.

Symptoms.—It usually commences by discharge from the heels or the cleft of the frog of the horse's foot. The horn becomes soft and disintegrated, the vascular structures beneath become inflamed, and the pain which the animal endures is severe, making it very lame. Though there is no constitutional fever, the horse becomes emaciated and unfit for work. During wet weather, and on damp soil, the symptoms increase in severity. The sore structures bleed on the least touch, and considerable fungoid granulations, commonly called proud flesh, form rapidly. Dirt, cold, and wet favor the production of the disease, and there is always a tendency to relapse when once an animal has been affected.

Treatment.—Pare away detached portions of horn, and, in mild cases, sprinkle powdered acetate of copper over the sore; apply over this pledgets of tow, fixed over the foot by strips of iron or wood passed between shoe and foot. In severe cases, tar and nitric acid, creosote and turpentine, chloride of zinc paste, and other active caustics have to be used for a time, with the regular employment of pressure on the diseased surface. The animal requires to be treated constitutionally by periodical purgatives and alteratives. Good food, fresh air, and exercise often aid much in the treatment of the disease.

CANKER. A disease of plants, especially fatal to fruit-trees, as well as a number of forest trees, as the larch. It is caused by the fungus *Nectria ditissima*, and usually begins in the young shoots and branches, and, gradually proceeding toward the trunk, kills the tree in the course of a few years. The attack of the fungus begins most readily in shoots that have been imperfectly ripened and injured by frost, or which have received some accidental wound. Those varieties of fruit-trees which have been long propagated by grafting and budding are most liable to it. It is sometimes cured by *heading down* the tree, and causing it to throw out new branches. See *Apple Diseases*, under APPLE.

CANKER-SORE. A small, yellow, round or linear sore, very tender, and forming a depression on the under side of the tongue or on the inner surface of the lips or cheeks. It is temporary and only local, and may be removed by the application of solid or dissolved silver nitrate, or of pure carbolic acid. It is developed chiefly among children, and is generally caused by digestive derangements.

CANKERWORM. A gregarious caterpillar of either of two moths of the geometrid family Monocteniidæ. One is on the wing in the autumn and the other in the spring. The moths of the spring cankerworm (*Paleacrita vernata*) come forth from the chrysalis in the spring, but a few of them appear in the fall or on warm days of winter. The moths of the autumn cankerworm (*Alsophila pometaria*) emerge during October. Some few may delay coming out until warm days in winter. The moths of both sexes of the autumn cankerworm differ from those of the spring form in the absence of abdominal spines. The autumn form pupates in the ground in well-spun cocoons, while the cells of the spring forms are lined with only a few threads of silk. The body of the caterpillar of the autumn form is marked by six light longitudinal bands, and those of the spring form by eight. The eggs of the autumn form are laid in regular rows or masses, and are truncated in form, while those of the spring brood are ovoid and are laid in irregular bunches. Both forms agree in that the caterpillars feed on the leaves of fruit and shade trees, and descend to the ground to pupate. The female moths of both forms are wingless. The caterpillars are so voracious that they may denude whole orchards or groves of trees in a few days as though a flame had swept through, whence has arisen the local name, 'fire-worm.' This is the worm that strips currant-bushes of leaves in the spring, and it was to combat this caterpillar that the English house-sparrow was introduced into the United States; but it checked the cankerworms but little. (See HOUSE-SPARROW.) The wingless females may be caught as they creep up the trunk of a tree by bands of tarred paper or other sticky substance wrapped about the trunk of the tree. Shade-trees may be sprayed with Paris green in water; but this poison must be used with caution on fruit-trees.

CANLASSI, kän-läs′sē, GUIDO (1601-81). An Italian painter, born near Rimini. He is more often called 'Il Cagnacci.' A pupil of Guido Reni, whom he imitated, he is his superior as a colorist. Most of his paintings were executed in Vienna, where he was patronized by the Emperor Leopold I. There are pictures by Cagnacci in Rome and Florence, but his best works are in Germany and Austria.

CAN′NA (Lat., Gk. *κάννα*, *kanna*, reed). A genus of succulent herbs of the order Scitaminaceæ, natives of warm countries in both hemispheres, and extensively cultivated as foliage plants for heavy or mass effects. Stem 3 to 14 feet high, unbranched, leaves large, flowers mostly red or yellow, and borne irregularly in a terminal raceme or panicle. Many varieties are in cultivation. The dwarf (seldom exceeding 4 feet), large-flowered, French and Italian varieties are most in favor, and are much used as centrepieces in formal beds and in small clumps in borders. Cannas are propagated either from seed (new varieties) or by dividing the rootstock and planting in pots. They are of easy culture. A rich, warm soil with plenty of moisture is desirable. When wanted for mass effects, they are set about 6 inches apart each way, after danger of frost is past. The flowers should be picked as soon as they wilt, to prevent the formation of seed, and thus prolong the flowering season. After the stalks are cut in the fall, the roots are stored and handled like potatoes until wanted for planting. The roots of some species of canna contain considerable amounts of starch. *Canna coccinea* is sometimes used to supply starch.

CANNABICH, kän′ná-bĭk, JOHANN GÜNTHER FRIEDRICH (1777-1859). A German geographer, born in Sondershausen. He studied at the University of Jena, was in 1807 appointed rector of the town school in Greussen, in 1819 became pastor in Niederbösa, and in 1835 in Bendeleben. His *Lehrbuch der Geographie* (1816; 18th ed., 2 vols., 1870-75) has been widely circulated in Germany. His other works include: *Neuestes Gemälde von Frankreich* (2 vols., 1831-32), and *Hilfsbuch beim Unterricht in der Geographie* (3 vols., 1833-38).

CAN′NABIS. See HEMP.

CANNÆ (Lat., Gk. *κάνναι*, *kannai*, reeds). An ancient town of South Italy, on the right bank of the Aufidus (Ofanto), the site of which is 9 miles west of Barletta. Here on August 2, B.C. 216, Hannibal, with 40,000 foot and 10,000 horse, inflicted a terrible defeat on a Roman army consisting of 80,000 foot and 6000 horse, under the consuls Lucius Æmilius Paulus and Gaius Terentius Varro. The Carthaginian, who was encamped on the left bank of the Aufidus, led his army across the river, and offered battle on ground unfavorable for the Romans, who declined to accept the challenge. The next day he followed the Romans back to the left bank, and the contest began with the right Roman and the left Carthaginian wing resting on the river. Hannibal arrayed his forces in the form of a crescent, so that when the Romans repulsed the Iberians and Gauls and pressed forward in thick column, the Libyans attacked them on both flanks. The Carthaginian cavalry soon overwhelmed the Roman horse, and then fell upon the Roman foot from the rear. Varro, with seventy knights, escaped to Venusia, and a few thousand Romans assembled at Canusium from the rout; but at least 10,000 were captured and an immense number killed, among them Æmilius Paulus. Consult: Reuschi, *Die Schlacht bei Cannæ* (Altkirch, 1888); Solbesky, *Die Schlacht bei Cannæ* (Weimar, 1888); and Wilms, *Die Schlacht bei Cannæ* (Hamburg, 1893).

CANNEBIÈRE, kä′ne-byâr′ (Fr., from Gk. *κάνναβις*, *kannabis*, hemp), La. The chief boulevard of Marseilles, so called because of a former rope-walk there. The Marseillais are often called 'Children of the Cannebière.'

CANNEL COAL (said to have turned in the drawling pronunciation of the miners from *candle-coal*, as it burns with a bright, candle-like flame). A dull, fine-grained variety of bituminous coal, which has a conchoidal fracture. Owing to its very high percentage of volatile hydrocarbons, it is specially valuable for gas-making. It is considered by some to be derived from the accumulation of animal as well as plant remains. In the United States, the Breckenridge cannel coal of eastern Kentucky is the most noted occurrence, though it is also found in Ohio and Indiana. Some is also found in Scotland, and is there known as parrot coal. See COAL.

CAN′NELTON. A city and the county-seat of Perry County, Ind., 140 miles south by west of Indianapolis, on the Ohio River and on the Southern Railroad (Map: Indiana, C 5). It has fine county buildings. The city is an important industrial centre, and has extensive cotton-mills, lumber and flour mills, foundries and machine-shops, and manufactures of chairs, hubs, sewer-pipe, pottery, bricks, etc. There are coal-mines and sandstone-quarries in the vicinity. Population, in 1890, 1991; in 1900, 2188.

CANNES, kån. A seaport in the Department of Alpes-Maritimes, France, pleasantly situated on the Mediterranean, about 22 miles southwest of Nice (Map: France, N 8). The district in which it lies is exceedingly picturesque and very fertile. Oranges, lemons, olives, almonds, figs, peaches, and grapes are extensively cultivated. Placed on an elevation that slopes toward the sea, it is sheltered from the northern winds by a range of hills. It is famed for its salubrity, is a favorite winter residence, and one of the most fashionable resorts in France. Its architectural features include the Abbey Donjon, built about 1070 on the site of the Roman Castrum Marcellinum, the town hall, library, and museum of antiquities (1876). There is considerable trade in fruit, olive-oil, soap, perfumery, and salt fish. Population, in 1896, 19,470.

CANNIBALISM. The practice of eating human flesh. The word is derived from Caniba, a variant of Carib, the name of the West Indian tribe among whom the Spanish discoverers first noticed the custom. The practice is very widespread, having been found within the historic period in both Americas, in Africa, India, Australia, New Zealand, and throughout the Polynesian islands. Some early European tribes, and even some of the more cultured early heathen nations, have also been accused of the same practice. By some students cannibalism has been ascribed to economic causes merely, but in most, if not all cases, the custom appears to have had its origin in the superstitious belief that in this manner the qualities of the person eaten, particularly if a brave enemy, might be acquired, or his post-mortem ghost existence utterly destroyed by leaving nothing in which the spirit might still find lodgment. In some tribes the first-mentioned idea even led children to eat the bodies of their deceased parents. In isolated instances cannibalism appears to have been dictated by no other motive than that of mere savage revenge. Although cannibalism thus appears to have been originally almost a religious ceremonial, the depraved appetite sometimes grew to such an extent that in many tribes human flesh became a regular article of diet. This was especially the case in equatorial Africa, in some of the South Sea Islands, among the Tapuyan tribes of Brazil, and on the headwaters of the Amazon. The ancient Aztecs annually sacrificed thousands of human victims to their gods, the bodies being afterward eaten by the populace. Cannibal practices are still common among the tribes of Vancouver Island and the northwest coast of North America. Occasional ceremonial cannibalism was quite general among the Indians of the United States, but the only tribes which practiced it to any great extent were the Atakapa, Tonkawa, and some others of the western Gulf Coast.

CAN'NIFF, William (1830—). A Canadian author and physician, born at Thurlow, Ontario, Canada. He graduated at Victoria University and studied medicine in Toronto, New York, and London. During the Crimean War he served for a time in the Army Medical Department, and after his return to Canada became professor of general pathology, and subsequently of surgery in Victoria University. He was for a time with the Army of the Potomac during the Civil War, and at its close returned to Canada and resumed the practice of medicine. In 1867 he was a delegate to the International Medical Congress in Paris, and contributed a paper on the Indians of British North America; and in the same year he assisted in the formation of the Canadian Medical Association. For many years he was on the editorial staff of the *Canadian Medical Journal*, and, besides contributions to various periodicals, he has published *Principles of Surgery* (1866); *Settlement of Upper Canada* (1869); *Canadian Nationality* (1875); and *The Medical Profession in Upper Canada* (1894).

CAN'NING, Charles John, Earl (1812-62). An English statesman, Governor-General of India during the Great Mutiny. He was the third son of the celebrated statesman George Canning, was educated at Eton and Oxford, and succeeded to the peerage as Viscount Canning in 1837. In 1841 he became Under-Secretary of State for Foreign Affairs in Sir Robert Peel's Ministry, and afterwards was chief commissioner of woods and forests. When Lord Aberdeen came into office, he was made Postmaster-General, and in the beginning of 1856 he succeeded Lord Dalhousie as Governor-General of India. His conduct during the crisis of the Indian mutiny was described at the time by many as weak and pusillanimous, and he received the nickname of 'Clemency Canning.' With all the circumstances of the case better known, however, it is generally conceded that he acted with firmness and courage, combined with magnanimity and impartial justice. In 1858 the government of India was transferred from the East India Company to the Crown, and he thus became first Viceroy of India. In 1859 he was raised to an earldom. He died in London. Consult Cunningham, *Earl Canning*, in the Rulers of India Series (London, 1891).

CANNING, George (1770-1827). A distinguished British statesman and orator, born in London April 11, 1770. His father, who died in poverty when his son was a year old, came of an ancient Bristol family, whose ill-will he incurred by marrying beneath his station. His mother earned a precarious subsistence on the stage, and married twice again, first an actor, and after his death a Plymouth linen-draper. Through Canning's filial affection, she subsequently lived in comfort and participated in his success and good fortune. When eight years of age, his uncle, Stratford Canning, a banker, provided for his education and sent him to Eton, where he soon distinguished himself. He founded a school magazine, *The Microcosm*, for the copyright of which a publisher paid him £50, an unparalleled remuneration for a school-boy author. In 1788 he proceeded to Christ Church, Oxford; the following year, he won the Chancellor's prize with his *Pilgrimage to Mecca*, and in 1790 graduated B.A. He entered Lincoln's Inn and studied law. At school and college he made influential friends, notably the Hon. Charles Jenkinson, afterwards Lord Liverpool, and at his uncle's house met Fox and Sheridan, and through them Burke and other well-known men. Burke persuaded him to abandon law for a Parliamentary career, and, under the ægis of Pitt, he entered Parliament as member for Newport, Isle of Wight, in 1793. In 1796 he became Under-Secretary for Foreign Affairs, and in 1798 acquired fame as an orator and statesman by his speeches for the abolition of the slave trade, and against making peace with the French Directory. In debates on other important questions he supported the Ministry, not only by voice, but also by his pen in a satirical paper called the *Anti-Jacobin*, which lashed the 'new philosophy,' promulgated by the French Republicans. In 1800 he made a happy marriage with the wealthy heiress Joan Scott, sister to the Duchess of Portland. In 1801 Pitt resigned and Canning joined the opposition against the Addington Ministry, but excited serious and life-long enmities by his caustic wit and criticisms. In 1804 Pitt returned to power, and Canning became treasurer of the navy, continuing in office until Pitt's death in 1806. Lord Grenville offered him an office in the All-the-Talents Ministry, but Canning declined. In 1807 he was appointed Foreign Minister in the Portland Cabinet, and displayed brilliant qualifications. He originated Nelson's secret expedition and seizure of the Danish fleet at Copenhagen, which upset Napoleon's northern confederacy. Differences, running through several years, with Lord Castlereagh, culminated in 1809, and led to a duel, in which both were hit, though neither was seriously injured. In 1812 Canning's eloquence was enlisted in favor of Catholic emancipation. The same year Liverpool sent him to Parliament, and repeated the honor three successive times. In 1814 he was ambassador at Lisbon, and in 1816, on his return, became president of the Board of Control. He supported the Liverpool Ministry in their repressive measures until 1820, when he resigned in consequence of the governmental action against Queen Caroline. He was on the eve of departure for India as Governor-General in 1822, when the suicide of his former antagonist Castlereagh called him to the head of foreign affairs. In this capacity he infused a more liberal spirit into the Cabinet, asserted the independence of British politics against entanglement with the Holy Alliance, and gave new direction and impetus to commerce by a gradual suspension of the prohibitive system. He arranged the relations of Brazil and Portugal, drew the French Cabinet into agreement with the British respecting Spanish American affairs, and was the first to recognize the free States of Spanish America, when he pronounced his famous dictum that "the New World had been called into existence to redress the balance of the Old, and would in time outweigh and topple over the fabrics of kingcraft, upon which so many wise men had labored for thousands of years." He promoted the treaty combining England, France, and Russia, for the settlement of the affairs of Greece; protected Portugal from Spanish invasion, and, among other important home measures, prepared the way for the repeal of the corn laws. In February, 1827, paralysis attacked his old friend the Earl of Liverpool, and Canning was called upon to form a new administration. His health, however, succumbed to the cares of office, and he died at Chiswick on August 8 in the room where, twenty-one years earlier, Fox had died. He was buried in Westminster Abbey, near Pitt. Consult: Rueder, *G. Canning, sein Leben, etc.* (1827): *Canning's Speeches*, edited by Therry (6 vols., 2d ed., London, 1830); Stapleton, *Political Life of Canning* (London, 1831); Stapleton, *George Canning and His Times* (London, 1859); Lord Dalling, *Historical Characters* (London, 1867). For the best account of Canning's connection with the negotiations preceding the War of 1812, see Henry Adams, *History of the United States* (9 vols., New York, 1889-91).

CANNING, Sir Samuel (1823—). An English telegraphic engineer, born in Wiltshire. He was a pioneer in the manufacture and submersion of cables for submarine telegraphy, was engineer-in-chief of the Atlantic-cable expeditions of 1865-66 and 1869, and laid lines from England to Malta, Alexandria, and Gibraltar.

CANNING, Sir Stratford. See Stratford de Redcliffe, Viscount.

CANNING INDUSTRY. See Foods, Preservation of.

CANNIZZARO, kän'nē-tsä'rō. Stanislao (1820—). A celebrated Italian chemist. He was born in Palermo, and studied medicine and chemistry in his native city and later in Pisa. In 1852 he became professor of chemistry in Alessandria, in 1857 in Genoa, in 1860 in Palermo, and in 1870 in Rome. In 1871 he was made a Senator. Cannizzaro was one of the ablest defenders of Gerhardt's views, and the introduction of Avogadro's rule into science is due almost entirely to the clearness with which he grasped the distinction between atomic and molecular weights. His work has thus given a powerful impulse to the development of modern chemistry. Among his minor contributions may be mentioned the discovery of benzyl-alcohol and of cyanamide. Ostwald's series of *Klassiker der exakten Wissenschaften* includes Cannizzaro's *Abriss eines Lehrganges der theoretischen Chemie* (Leipzig, 1891; first published in 1858). See also Chemistry; Avogadro's Rule; Atomic Weights; Molecules—Molecular Weights.

CAN'NOCK. An important coal-mining and iron-manufacturing town in Staffordshire, England, situated in the ancient royal forest of Cannock Chase, 7½ miles northwest of Walsall (Map: England, E 4). Population, in 1891, 20,600; in 1901, 24,000.

CANNON (Fr. *canon*, gun, from Med. Lat. *canon*, tube, Lat. *canna*, reed; confused with Gk. κανών, *kanōn*, straight rod, rule). Artillery weapons not capable of being carried and fired in the hands, and from which projectiles are thrown by the expansive force of gases, produced by the combustion of an explosive. They are either smooth-bore or rifled. The former class of cannon, which are now obsolete, were used to fire spherical projectiles, while from the latter oblong projectiles are discharged. Cannon may be divided into three classes: First, guns, or those cannon in which the length of the bore is relatively great in comparison to the calibre; second, mortars, or those cannon in which the length of the bore is relatively small in comparison with the calibre; third, howitzers, or those cannon whose relative length and calibre place them between the other two classes. They may also be classified according to their use into mountain artillery, field artillery, siege artillery and seacoast or fortress artillery, a classification which will be observed in this work. A further classification divides them into those in which the powder-charge is inclosed in a metallic cartridge-case and those using a cartridge-bag. The former group is subdivided into machine-guns, revolving cannon, and rapid-fire guns. As to construction, cannon are divided into those made of a single piece and those built up of two or more pieces, as is now usually the case. Built-up cannon are either composed of steel forgings, having a tube extending through the length of the bore, with superposed concentric hoops, or a tube with the remainder of the wall composed entirely or in part of a rectangular, circular, or ribbon form of wire. Service cannon in the United States, excepting machine-guns, are generally of the built up, forged-steel type. See Ordnance; Artillery; Coast Artillery; Field Artillery; Guns, Naval; Howitzer; Machine Guns; Rapid-Fire Guns; and Siege Guns for descriptions and illustrations of various forms of cannon.

CANNON, George Q. (1827-1901). An influential leader of the Mormon Church. He was born in Liverpool, England, was early converted to the Mormon faith, and accompanied his parents to Nauvoo, Ill., about 1814. He was one of the first Mormon settlers in Salt Lake City, was sent on a mission to the Sandwich Islands in 1850, translated the *Book of Mormon* into the Hawaiian language, and after his return, in 1854, edited successively the *Western Standard* and the *Deseret News* in the interest of the Church. He was sent to Washington with W. H. Hooper in 1862 to urge the admission of Utah as a State, was in charge of the Mormon mission in England from 1862 to 1864, and from 1872 until 1881 was the Territorial delegate of Utah to Congress. He held various positions of importance in the Church, including that of first councilor after 1880, was a member of the Legislative Council of Utah in 1865, 1866, 1869, 1870, 1871, and 1872, and wrote a number of pamphlets in support of Mormonism.

CANNON, Joseph G. (1836—). An American lawyer and Congressman, born at Guilford, N. C. He was admitted to the bar of Illinois, from 1861 to 1868 was State's attorney in Vermilion County, and from 1873 to 1891 served as a Republican in the Federal House of Representatives. By successive reëlections he held the same office from 1893 to 1903. He was chairman of the Committee on Appropriations in the Fifty-fifth and Fifty-sixth Congresses.

CANNON-FOUNDING. See Ordnance.

CANNSTATT, kän'stät. A town of the Kingdom of Württemberg. It is beautifully situated on both sides of the Neckar, which is crossed by three bridges, about three miles northeast of Stuttgart, with which it is connected by an electric street railway line (Map: Germany, C 4). The newer portion of the town is well built, with handsome streets and pleasant recreation grounds. It is chiefly notable on account of its saline and chalybeate springs, which, with its mild and healthful climate, have made it a favorite watering-place. Of late years Cannstatt has entered to a considerable extent into industrial pursuits, and has flourishing manufactures of machinery, cooking utensils, woolen goods, etc. It owes its origin to the Romans, of whose presence there are still found many traces. It suffered much during the Thirty Years' War and through the repeated invasions of the French. It was the scene of the victory of the French under Moreau over the Austrians under Archduke Charles, July 21, 1796. Population, in 1890, 19,800; in 1900, 26,500.

CANO, kä'nō, Alonso (1601-67). A Spanish sculptor, architect, and painter. He was born in Granada and studied sculpture under Montañes and painting under Pacheco at Seville. In 1637, in consequence of a duel, he fled to Madrid, where, through the influence of Velazquez, he was appointed court painter. The story that he was compelled to flee to a monastery because suspected of the murder of his wife, and that he afterward proved his innocence on the rack, is now discredited. In 1651, at his own request, he was made a canon of Granada, where he resided until his death. Because of the versatility of his talents and the high character of his work, Cano has been frequently called the Spanish Michelangelo. His painting was good in color and careful in design, as is witnessed by his admirable pen-and-ink studies, but his work is rather eclectic than original. Since the dissolution of the monasteries, his numerous paintings have been much scattered. The Cathedral of Granada possesses many fine examples, and there are six in the Prado. He is also represented at Munich, Berlin, and Saint Petersburg. His sculpture, mostly of colored wood, is frankly realistic in technique, simple in pose, and intense in expression.

CANO, kä'nō, Juan Sebastian del (? - 1526). A Spanish navigator, born in Guetaria. He became captain of a vessel trading with Africa and the Levant, and commanded one of the five vessels of Magellan's famous expedition. After Magellan's death (April 27, 1521) he succeeded the deposed Carabello as chief of the expedition, and, having visited the Moluccas, reached Spain with one ship in 1522, being thus the first to circumnavigate the globe. He was appointed second in command to Loaisa in another expedition of five vessels which set sail July 25, 1525. In the Pacific, storm and disease attacked the vessels, and Cano died on August 4, 1526. The *Victoria*, in which he had accomplished his first voyage, was long preserved at Seville.

CANO, Melchior (1509-60). A Spanish theologian. He was born at Tarancon in Spain, entered the Dominican order at the age of fifteen, and was ordained priest in 1531. He was employed for years in teaching theology, and gained the professorships at Alcantara (1543) and Salamanca (1546) over formidable competitors. He was a determined opponent of the newly founded Society of Jesus, objecting to its marked departures from the traditions of the older orders. Charles V. sent him to the Council of Trent as theologian in 1551, and he took a prominent part in its deliberations. A year later, again on the Emperor's nomination, he was consecrated Bishop of the Canary Islands; but for some unknown reason he never took possession of his see, retiring to the monastery of Piedrahita, and spending the rest of his life in theological study and works of charity. The first edition of his epoch-making work, *De Locis Theologicis*, on the sources of theological knowledge, appeared in Salamanca in 1563, followed by more than thirty other editions; his complete works were published in Padua, in 1720. Consult Fermin Caballero, *Vida del ilustre Fray Melchior Cano* (Madrid, 1871).

CANOE, and **CANOEING** (Sp. *canoa*, canoe, from Carib *canáoa*). Strictly speaking, a canoe is a light boat designed to be propelled by a paddle held in the hands, without any fixed support; and in the main that is correct, although in some cases canoes have an auxiliary sail, to be used under favorable conditions; and, for modern sporting purposes, some use sails only and no paddles.

Early canoes were merely a few thin strips of wood laid across each other at various angles, tied together, and bent upward, so as to form a frame much like an umbrella-frame upside down. Over that a skin was stretched and sewn. With this primitive canoe rivers and estuaries were crossed. It existed until quite recent times in America, and does so to-day in the Irish and Welsh coracle.

The tree, hollowed either by nature or fire, was the second stage of evolution, and canoes of this kind are common on the African rivers to-day. Upon them the bulk of the commerce of the continent was carried until lately, and it is therefore not surprising to find specimens of them in the familiar dugout of the Southern States. The islands of the Pacific, depending upon the adjacent seas for material sustenance, and having little available timber, naturally produced the first builders who made a canoe out of planks. Those in Samoa are regularly built of several pieces of wood of irregular shape, fastened together with sennit and cemented all over with gum from the bark of the breadfruit-tree, to prevent their leaking. Where the South Sea Islanders had larger timber, as did the Philippine Islanders, they built from a single tree-trunk, with an outrigger, and sometimes two, excepting on the canals and rivers, where the space was too narrow for them. In some of the islands two canoes were lashed together, like the catamaran (q.v.): in others, fixed outriggers extended from each side. In fact, the design and method of propelling the canoes of Polynesia are endless in variety, but all masterpieces of adaptability to the conditions of their locality and their use. Wonderful sailors, too, are the natives who, in them, undertake even long sea voyages, far out of the sight of land, in passing from one group of islands to another. The coasts of the mainland of Siam, Burma, and China swarm with canoes. America, too, has a great variety, from the skin-covered bones which the Eskimo paddles in the Arctic seas to the shallow canoe which the Seminole poles in the Everglades of Florida. But probably the perfection of canoe-building in America was accomplished by the primitive inhabitants of the wilderness of waters in the great Northwest, who stretched the bark of the birch over a framework of marvelous lines and produced a craft which for lightness, safety, and endurance has no equal in the world; and lightness tells where the necessities of portaging over heights of land, from watershed to watershed, and around waterfalls or rapids, is a frequent necessity. In this canoe the canoeist kneels facing the bow and applies the force of his paddle either on one side entirely, correcting its force by trailing it as a rudder, or alternately first on one side and then on the other. It is possible to paddle one of these canoes from Lake George to the Gulf of Mexico; and if the canoeist turned north instead of south he could go to the Arctic Sea.

Modern canoeing as a sport largely owes its popularity to two men in England who built canoes capable of being either paddled or sailed, and took long pleasure journeys in them—John Macgregor in the *Rob Roy* between 1866 and 1869, and Baden-Powell in the *Nautilus*. The sport rapidly spread on both sides of the Atlantic, dividing itself into two schools, sailing and paddling, and naturally into two classes of designs. The Canadian (or birch-bark pattern), open and undecked, built of basswood or cedar, or even paper or canvas, was chosen by the paddling fraternity. The sailors took for their first ideas the two English boats, the *Rob Roy*, a lapstreak built of cedar strips, about 14 feet long by 26 inches broad, excellent for easy rivers and coasting, but bad for rapids and portaging, or the *Nautilus*, which was designed exclusively for sailing. American ingenuity soon busied itself with inventions, and every device which could lessen weight was adopted. Charles B. Vaux invented the stationary deck seat and tiller about 1882. Paul Butler added, four years later, the sliding seat, on which the canoeist balances away out over the side of the boat, more like an acrobat than a sailor. Then followed years of elaboration in reefing and lowering sails, ending with the adoption of standing sails which cannot be lowered or reefed; and experiments with folding centreboards without number. Finally, the well or cockpit was done away with, save a depression in the deck, of small size, and some six inches deep. This tendency to convert the canoe into a machine, and the consequent winning of every contest by the few men who could handle them, has been largely responsible for the lessened interest in canoe-racing contests, but as a pleasant sport and summer pastime it still numbers its devotees by thousands.

In America, the New York Canoe Club was founded in 1871. The American Canoe Association holds an annual meeting extending over a fortnight, the first week of which is devoted to camping out and cruising, and the second to racing. It associates the Northern (Canadian Association, with 47 clubs), the Eastern (Atlantic, with 32 clubs), the Central (with 26 clubs), and the Western. Each of these divisions holds sectional meetings, but numerous clubs exist which do not belong to any association.

In Great Britain, the Royal Canoe Club was formed in 1866, and it has ever since been the principal organization, with headquarters at Kingston-on-Thames, near London. There is another, the British Canoe Association, which devotes its attention entirely to cruising.

Consult: Macgregor, *A Thousand Miles in the Rob Roy*, *The Rob Roy on the Baltic*, and *The Rob Roy on the Jordan and the Red Sea* (London, 1874); Baden-Powell, *Canoe Traveling* (London, 1871); Holding, *Watery Wanderings* (London, 1886); *Canoeing and Camping Out* (Bell's Handbooks, London, 1893); Vaux, *Canoe Handling* (New York, 1888); Henshall, *Camping and Canoeing in Florida* (Cincinnati, 1884); Neide, *The Canoe Aurora's Cruise from the Adirondacks to the Gulf* (New York, 1885); Stephens, *Canoe and Boat Building* (New York, 1891).

CANON (OF. *canone*, Late Lat. *canonicus*, from Lat. *canon*, rule, Gk. *κανών*, *kanōn*, straight bar, rule, norm). An ecclesiastic not belonging to any of the religious orders, but living in a community under a definite rule of life. As early as the Fourth Century, Eusebius of Vercelli (died c.371) united the clergy of his see city into such a community, and the example was followed in the Fifth by Saint Augustine at Hippo. There are indications of the early existence of the institution at Tours, at Rheims, and at the Lateran in Rome; but it was not common until the end of the Eighth Century. Its origin is sometimes erroneously ascribed to Chrodegang, Bishop of Metz from 742 to 766; but his real service was the reduction to writing of a rule of life, which was adopted by many other bodies of canons. It was taken partly from the rule of Saint Benedict (he was a Benedictine himself), and partly from the traditions of the Lateran canons. With some adaptations by the deacon Amalarius of Metz, it was confirmed by Louis le Débonnaire in the great council of Aix-la-Chapelle, in 816 or 817, as binding throughout the Frankish dominions. Under this rule the canons lived under one roof, with a common table; the regular employment of their whole time was prescribed, and a spirit of brotherhood fostered. They differed from monks in wearing no cowl and making no religious vows. The immediate head of the community, under the bishop, was in the rule of Chrodegang the archdeacon, in the constitution of Aix a provost, or in some churches an abbot.

The early fervor gradually decayed and disorders crept in, partly owing to the possession of private property and the growing wealth of certain chapters, and partly to the troubled condition of Europe in the decline of the Carlovingian monarchy. Vigorous reforms were attempted, in harmony with the spirit of the time, in the Eleventh Century, notably by Saint Peter Damian and by Roman synods under Nicholas II. (1059) and Alexander II. (1063). These councils not only laid down strict rules for the maintenance of a common life, but strongly urged the abandonment of private property. This counsel was soon followed in many places. As the newer organizations were largely based upon the example and writings of Saint Augustine, his name was generally attached to their rule, perhaps first by Gervasius, Archbishop of Rheims, in 1067. (See Augustinians.) At first, and even after there were as many as 4000 houses of the kind, they had no connection with each other; but in 1339 Benedict XII. established a system of general and provincial chapters, whose decisions were to be binding on all houses under their jurisdiction. In spite of this, a century later these ties had been much relaxed, and the spirit of poverty forgotten. No further attempt was made at general reformation, although various separate societies succeeded brilliantly in restoring the old standards. Many of the old foundations were destroyed at the Reformation, and many more by the revolutionary developments from the end of the Eighteenth Century, so that only a few congregations now exist. Of these the principal ones are the Lateran canons, who possess a few houses in Austria, including Klosterneuburg, near Vienna (founded 1106), and the Premonstratensians (q.v.).

In modern times, the title of canon is applied to the dignitaries, whether in the Roman Catholic Church or in the Church of England, who form a sort of council to the bishop and perform certain duties in his cathedral church. For their organization, see more particularly Chapter.

CAÑON, kȧ-nyōn′ *or, Engl. pron.*, kăn′yon, or **CANYON** (Sp. *cañon, caña*, tube, funnel, cannon). A term applied in the United States to a deep and extensive ravine along a watercourse. Cañons are formed by the erosive action of rivers on their beds, and are usually limited to the upper portions of basins, where the water flows with considerable velocity. They are typical of dry climates and of plateau regions which have been elevated in comparatively recent geological times. In moist climates rock decomposition and denudation keep pace with erosion, and the combined action of these agencies leads to the carving out of broad, open valleys, a result which may be produced after a very long period in a dry climate. But, unless the slope of the river-bed has been greatly reduced, the erosive action of the water in regions of small rainfall will be more effective than the atmospheric agencies, and consequently the walls of the channel will have a precipitous character. The nature of the rock over which the river flows is also a factor in the formation of cañons; hard rocks usually decompose slowly, and thus preserve the contours of the channel as originally determined by erosion. There are many cañons in the western part of the United States, the most notable being the Grand Cañon of the Colorado, which is more than 300 miles long and has almost vertical walls from 3000 to 7000 feet in height. The Rio Grande and Yellowstone have similar but less extensive cañons. The name is sometimes applied in the Western States to the narrowing and deepening of the channel as a river crosses a mountainous barrier, but in such instances it does not differ from a gorge. See River; Colorado River; Yellowstone National Park; etc.

CANON (Lat., from Gk. κανών, *kanōn*, straight bar, rule, norm). A particular form of part-music based on strictest imitation. The opening theme or melody, the *antecedent*, is repeated by the other part or parts, and is then called the *consequent*. There is severe observance of the intervals of the melodic design, each part 'coming in' after exactly the same number of measures or bars as the second part comes in after the beginning of the theme by the first part. During the flourishing period of polyphonic music the canon and fugue (q.v.) reached their highest stage of mechanical perfection. Up to the present time they constitute the most difficult portions in the formal study of the art of music.

CANON, kä′nôn, Johann (properly Johann von Straschiripka) (1829-85). An Austrian painter, born in Vienna. He became an officer of cuirassiers in the Austrian Army, and subsequently, having gained some success with pictures executed largely under the influence of Rahl, traveled in England, France, Italy, and the Orient. His works include genre pictures, historical pieces, and portraits—the latter in a largeness of manner reminiscent of Rubens or Van Dyck. Energetic in drawing, and skillful in effects of light and shade, he nevertheless lacks originality. Of his works, may be mentioned "Cromwell Beside the Corpse of Charles I.," "The Treasure-Digger," and "The Flamingo Hunt."

CAN′ON AL′EXANDRI′NUS (Lat.). The Alexandrine Canon, so called, is made up of lists of the best Greek writers in the various fields of literature, and is commonly attributed to Aristophanes of Byzantium (q.v.) and Aristarchus (q.v.). It is possible that the older parts of the extant lists go back to these scholars, but it is now agreed that the canon of the orators is as late as the Pergamene School, and indeed may have been prepared by the rhetor Cæcilius in the time of Augustus; the canon of the historians is not earlier than the Second Century B.C.; and the canons of the sophists, grammarians, and physicians all belong to our era. It has commonly been supposed that Aristophanes and Aristarchus selected the best authors in the several fields, and that this selection contributed to the loss of the works of other authors; but it has recently been shown in the Wilamowitz-Möllendorff *Textgeschichte der griechischen Lyriker* (Berlin, 1900) that for the lyric poets, at least, the list represents only a codification of the works of the nine poets included, which had already been selected as best by the judgment of preceding centuries. That this was the case with other parts of the canon can hardly be doubted. Three lists of the best authors have been preserved to us, which do not, however, agree in all details: (a) One first published by Montfaucon, now best edited by Usener in his Dionysius of Halicarnassus, *De Imitatione Reliquiæ* (Bonn, 1889); (b) the second, first edited by Cramer, *Anecdota Græca*, IV. (Oxford, 1841); (c) a third, published with the two already named by Kroehnert, *Canonesne Poetarum Scriptorum Artificum per Antiquitatem fuerunt?* (Königsberg, 1897). Further information is given by Dionysius of Halicarnassus in his rhetorical writings, Quintilian, book x., Velleius Paterculus, i. 10, Proclus in his *Crestomathy*, and by Tzetzes in his introduction to Lycophron's *Alexandra*. The older part of the canon published by Montfaucon is as follows: *Epic Poets.*—Homer, Hesiod, Pisander, Panyasis, Antimachus. *Iambic Poets.*—Simonides, Archilochus, Hipponax. *Tragedians.*—Æschylus, Sophocles, Euripides. Ion, Archæus. *Comic Poets.*—*Old Comedy:* Epicharmus, Cratinus, Eupolis, Aristophanes. Pherecrates, Crates, Plato. *Middle Comedy:* Antiphanes, Alexis. *New Comedy:* Menander, Philippides, Diphilus, Philemon, Apollodorus. *Elegiac Poets.*—Callinus, Mimnermus, Philetas, Callimachus. *Lyric Poets.*—Alcman, Alcæus, Sappho, Stesichorus, Pindar, Bacchylides, Ibycus, Anacreon, Simonides. *Orators.*—Demosthenes, Lysias, Hyperides, Isocrates, Æschines, Lycurgus, Isæus, Antiphon, Andocides, Dinarchus. *Historians.*—Thucydides, Herodotus, Xenophon, Philistus, Theopompus, Ephorus, Anaximenes, Callisthenes, Hellanicus, Polybius. To the lists of older poets should be added the list of the Tragic Pleiades, embracing poets of the Third Century B.C.—Lycophron, Alexander, Sosiphanes, Sositheos, Dionysiades, Homer of Byzantium, Philiscus. The canon of the ten sophists cannot be earlier than the Fifth Century A.D., for it includes besides Dio Chrysostom, Nicostratus, Polemon, Herodes, Atticus, Philostratus, Aristides, the later Libanius, Themistius, Himerius, and Eunapius. The dates of the canons of the grammarians and physicians are uncertain. Consult: Susemihl, *Geschichte der griechischen Litteratur in der Alexandriner-Zeit*, II. (Leipzig, 1892); Steffen, *De Canone qui Dicitur Aristophanis et Aristarchi* (Leipzig, 1876); and the works quoted above.

CAÑON (kăn′yon) **CITY.** A city and county-seat of Fremont County, Colo., 41 miles west by north of Pueblo, on the Arkansas River, 1 mile from the Royal Gorge and Grand Cañon, and on the Denver and Rio Grande, the Atchison, Topeka and Santa Fé, and other railroads (Map: Colorado, E 2). It is a noted health resort, situated at an elevation of 5315 feet, and surrounded on three sides by mountains, and famed alike for its mineral springs, its healthful climate, and its attractive scenery. The city is possessed of valuable natural advantages: it has abundant water-power; the soil is fertile, and in the vicinity are rich deposits of iron, coal, silver, copper, marble, limestone, and petroleum. Cañon City has a public library, and the State Penitentiary is located here. Population, in 1890, 2825; in 1900, 3775.

CANONESS. In the early Christian Church the name κανονικαί, *canonicæ*, was applied to women who, living not in communities, but in their own homes, made a vow to remain unmarried and took charge of various works of charity: the name was derived from their being enrolled in the official list or *canon* of the particular church. (See DEACONESS.) In the Ninth Century, when the development of the canonical life became general (see CANON), communities of women living under the rule, but not members of a religious order, were known by this name: education was their principal external function. Later, as in the case of the canons, they became differentiated into regular and secular. The secular canonesses, especially in Germany, came to differ very little from women living in the world; their rules were few and not rigorously observed, and their houses merely safe and dignified homes for unmarried women, who were in many cases required to be of noble birth. Several such communities of Protestant canonesses still exist in Germany. For the more formal religious orders of women, see SISTERHOODS.

CAN′ONGATE, THE. A street in 'Old' Edinburgh, which leads from Holyrood Palace up to the 'Castle.' It originally connected a distinct suburb, known as the Canongate and built in the Twelfth Century, with the town proper. It contains some tenements, a century or a century and a half old, which are notable for their extreme height. See Scott's *Chronicles of the Canongate.*

CANONICAL HOURS. The time fixed for divine service in the Catholic Church, but no longer strictly adhered to. These have not always been the same, and it is not known when nor by whom they were settled; but they are now fixed at seven, viz. matins and lauds, prime, terce, sext, nones, vespers, and compline. These used to be observed as follows: Prime, terce, sext, and nones, at the first, third, sixth, and ninth hours of the day, counting from 6 in the morning; vespers at the eleventh hour; compline, or *completorium*, as completing the services of the day, at midnight: and matins shortly after midnight. The reasons given for dividing the day into seven parts were—that in seven days the creation was completed, there are seven graces of the Holy Spirit, seven divisions of the Lord's Prayer, seven ages of a man's life, etc. The hours had also each their mystical reference to certain occurrences in the history of the Passion of Christ. They are called canonical because according to the canon or rule of the Church. The proper offices for the canonical hours are to be found in the Breviary (q.v.). In England the term is also applied to the hours within which marriages may be lawfully celebrated. These used to be between 8 and 12 in the morning, but a recent act extended them until 3 P.M.

CANON′ICUS (c.1565-1647). A Narragansett Indian chief, the constant friend of the early colonists, and especially of Roger Williams, to whom he was strongly attached. It was from him that Williams obtained his title to the lands that now constitute Rhode Island.

CANONIZATION. In the Roman Catholic Church, the act of the Pope by which a deceased person is solemnly declared to be a saint. It had its origin in the practice in the early Church of inserting in the commemorative prayer of the liturgy the names of those who had died as martyrs, or distinguished themselves as confessors of the faith. In the case of a doubtful claim to this honor, the decision at first rested with the bishop of the diocese, but was later reserved to the metropolitans. They were not seldom assisted by a council, and the question was sometimes referred to Rome. The first recorded Papal canonization, however, is that of Ulrich, Bishop of Augsburg, by John XV., in 993; but no claim to exclusive right was made until Alexander III. laid down in 1170 the principle which has ever since formed the basis of the law in the matter. Here and there holy men and women were revered as saints in their own neighborhoods, even after this, until Urban VIII. put a stop to the practice in 1634.

Canonization, as understood in modern times, is the culmination of a lengthy process. The prospective saint must first pass through the earlier stages of being declared a 'venerable servant of God,' and of beatification (q.v.). The last step involves an exceedingly minute inquiry, conducted with the most elaborate legal formalities; the rules of evidence applied to the testimony in support of alleged miracles (at least two of which must be proved to have been wrought since the beatification) are more strict than in any American or English court. An ecclesiastic known as the *promotor fidei*, and sometimes as the *advocatus diaboli*, is specially appointed to urge every possible objection and test to the utmost the validity of the claims advanced. When a favorable decision is pronounced (which is never less than fifty years after the person's death), the ceremony of canonization is performed in Saint Peter's with great pomp. Among the Eastern churches the principle of canonization is recognized. The right to perform the ceremony is supposed to be vested in the Patriarch of Constantinople, but it is rarely exercised. For the rules and ceremonies of Roman Catholic canonization, consult the standard authority, Pope Benedict XIV., *De Servorum Dei Beatificatione et Beatorum Canonizatione* (Bologna, 1734-38), of which a portion has been translated under the title *Heroic Virtue* (3 vols., London, 1850).

CANON LAW. The law of the Roman Catholic Church, embodied in the *Corpus Iuris Canonici*. Its sources are the Bible, the writings of the Fathers, the canons of the councils, the decretals of the Popes, the manuals of penance, custom, and secular legislation, especially in the code of Justinian. Comparatively early, attempts were made to codify the rules which governed the conduct of the Church and its members. One of the earliest attempts gave rise to the Apostolic Constitutions and Canons (q.v.). There were many other compilations at various periods which were followed by portions of the Church. (See Pseudo-Isidorian Decretals.) But all earlier collections were superseded by the *Decretum Gratiani*. This was compiled probably between 1139 and 1143, and was frequently known as the *Concordantia Discordantium Canonum*. It is composed of three parts. The first, divided into 101 *distinctiones*, subdivided into canons, treats of the sources of canon law, the organization of the Church, the ordination and the hierarchy of the clergy, the election and consecration of the bishops, the authority of the legates and primates. The second, divided into thirty-six *causæ*, subdivided into *quæstiones*, under which are given the pertinent canons, treats of judicial matters. The third, divided into five *distinctiones*, under which are given the canons, treats of the sacrament and the liturgy. The *Decretum* forms the first part of the *Corpus Iuris Canonici*. The second part contains four collections of decretals.

1. The *Decretals of Gregory IX.*, published in 1234, which contain the important decretals issued since the publication of the *Decretum*. No name was given to the collection by Gregory; the old authors called it *Liber Extravagantium* or *Pentateuchus*, from its division into five books.

2. The *Liber Sextus*, published by Boniface VIII. in 1298, containing decretals since 1234.

3. *Constitutiones Clementinæ*, published in 1313, withdrawn for revision and reissued in 1317. These contain the decretals of Clement V. and two issued by preceding popes.

4. The *Extravagantes* of John XXII. (1316-1334) and the *Extravagantes Communes*. The first contains twenty decretals of John; the second seventy-three issued by various popes between 1298 and 1484. The *Extravagantes* were never formally promulgated and have obtained a place in the canon law only by custom. All four collections follow the traditional order of subjects, *Iudex, Iudicium, Clerus, Connubia, Crimen*. The portions of the canon law are not all of equal authority, but the distinctions are too extensive to be discussed here. (See Bibliography at end.) In many editions of the canon law the *Institutiones* of Lancelottus are published as a supplement. The author states that he wrote this at the request of the Pope in order to make the canon law correspond more closely to the *Corpus Iuris Civilis* (q.v.). The *Decretum* corresponds to the Pandects; the Decretals of Gregory IX. to the Code; the *Sextus, Clementinæ*, and *Extravagantes* to the *Novellæ*; his work to the Institutes. It was published in 1563, and frequently since, but never approved authoritatively by the Pope. It is hardly necessary to add that, although the *Corpus* is still the authoritative collection, canon law has been constantly modified by later enactments.

During the Middle Ages the canon law was authoritative in all countries subject to the spiritual jurisdiction of Rome. The ecclesiastical courts embraced within their jurisdiction all members of the clergy, and, as a privilege, widows, orphans, crusaders, and students. But their jurisdiction extended over many other persons because they claimed the control over many cases, such as matters relative to the faith, sacraments, and vows; matters relative to marriage, ecclesiastical property, and wills; crimes against religion, or those committed in sacred places; violations of the truce of God (q.v.), the exaction of usury, i.e. interest, etc. Some of these subjects the civil authorities admitted to be wholly within the province of the ecclesiastical courts; with regard to other subjects, the civil courts claimed an equal or superior right of jurisdiction. As the royal authority became stronger in the different countries, the kings became jealous of an authority independent of their own, and attempted to bring the members of the clergy and certain classes of cases under their own jurisdiction. They were especially hostile to appeals to Rome. (See CLARENDON, CONSTITUTIONS OF.) Ultimately the royal authority triumphed and canon law became restricted almost everywhere to purely religious and ecclesiastical questions. It is still authoritative in many countries on many subjects, and it has modified profoundly both international law and civil law in the various countries of Europe. It is impossible to state briefly, and yet accurately, its varying authority in modern times in the different countries. Until recently its importance in Germany was very great. Down to the end of the Eighteenth Century it was a constituent element of the common law; since that time its authority has been greatly restricted and confined in civil matters to a comparatively few States. In France it was abrogated in 1790 by the 'Civil Constitution of the Clergy,' and it has never regained its position. In England it has no direct authority, but some portions of the English law are based upon canon law. In Scotland, curiously enough, when one considers Scotch history, the Roman canon law still prevails to a certain extent. Lord Stair said, in his *Institutes of the Scotch Law*, "So deep hath this canon law been rooted, that even where the Pope's authority is rejected, yet consideration must be had to these laws, not only as those by which church benefices have been erected and ordered, but as likewise containing many equitable and profitable laws, which, because of their weighty matter, and their being once received, may more fitly be retained than rejected." In two old Scotch acts of Parliament, made in 1540 and 1551, the canon law is used in conjunction with the Roman law to denote the common law of the country, the expression used being "the common law, baith canon, civil, and statutes of the realme." In the United States some laws borrowed from the English common law are based upon the canon law.

The best edition of the *Corpus Iuris Canonici* is edited by Friedberg (2 vols., Leipzig, 1879 81). The number of good works on the canon law is very great. Tardif, *Histoire des sources du droit canonique* (Paris, 1887), gives an excellent bibliography down to that date. See also Phillips, *Kirchenrecht* (7 vols., Regensburg, 1845-72, incomplete; continued by Vering, Vol. VIII., Regensburg, 1889); Schulte, *Geschichte der Quellen und Litteratur des canonischen Rechts von Gratian bis auf die Gegenwart* (3 vols., Stuttgart, 1875-83); Hinschius, *Das Kirchenrecht der Katholiken und Protestanten* (4 vols., Berlin, 1869-86); Maitland, *Roman Canon Law in the Church of England* (Cambridge, 1898).

CANON OF THE BIBLE. See BIBLE.

CANON OF THE MASS. That part of the mass which contains the fixed rule for celebrating the eucharist in the Roman Church, including the words whose use is believed to alter the elements into the veritable body and blood of Christ. Consequently this part of the mass was the storm-centre of controversy.

CANONS, BOOK OF. In Scottish ecclesiastical history, a code of canons or rules for the Church of Scotland, prepared by the Scottish bishops in obedience to the command of Charles I., revised by Laud, confirmed by letters patent under the great seal May 23, 1635, and published in 1636. It tended to increase the dissatisfaction prevalent throughout Scotland, which soon broke out violently. It was considered objectionable as the work of Laud, and because it was promulgated by the King without consultation with either clergy or laity. The canons are printed in the fifth volume of the collected works of Laud, *Library of Anglo-Catholic Theology* (7 vols., Oxford, 1847-60). See Burton, *History of Scotland*, Vol. VI. (Edinburgh, 1873).

CANONS OF THE CHURCH OF ENGLAND. The so-called constitutions and canons ecclesiastical, agreed upon, with the King's license, in the synod held in London in 1604. They were drawn up by the convocation, in order to give effect to the decisions of the conference held at Hampton Court, and are, in the main, a digest of old canons, with some new ones added. They are 141 in number. By these canons every clergyman was obliged to swear to subscribe willingly to the royal supremacy, the Prayer-book, and the Articles. All who declared the Prayer-book or Articles to be in any way superstitious were condemned. This was a defeat for the Puritan party, but most of them took the test oath rather than go into exile. The canons are still authoritative except for the parts revised by later canons. See Walcott, *The Constitutions and Canons Ecclesiastical of the Church of England, etc.* (Oxford and London, 1874).

CANON'S YEOMAN'S TALE. One of the *Canterbury Tales*. It is told by an itinerant and disreputable canon's starving servant and guard, and consists of a description of the various trickeries practiced by the alchemists, of which the canon is one, upon their credulous and avaricious dupes.

CANOP'IC VASES. The name given to the four vases in which the ancient Egyptians used to place the viscera taken from the dead when embalming them. The vases were mostly of stone, and the lids represented, in later times, the heads of the four genii, the so-called sons of Osiris, who protected each a special part of the intestines (stomach and large intestines; small intestines; lungs and heart; liver and gall-bladder). The modern name has no authorization from the classical writers.

CANO'PUS, or **CANO'BUS.** A city of ancient Egypt, about 14 miles east of Alexandria, at the Canopic mouth of the Nile, which was thus called after the city. It did not become a place of importance until after the foundation of Alexandria, when the Alexandrians used the town as a pleasure resort, and it had a rather bad reputation. Canopus was an important port, and had a temple of Serapis, with a famous oracle, much frequented by invalids in pursuit of health. The ruins of this temple were the field of successful excavations in 1893. The Greek name seems to be an assimilation of the name of the legendary helmsman of Menelaus with some unknown Egyptian word.

CANOPUS (Lat., from Gk. *Κάνωπος, Kanōpos*, a city of Lower Egypt). The name of a very brilliant star of the southern hemisphere, in the constellation of the ship *Argo*. According to Plutarch, it received its name from Canopus, the pilot of Menelaus.

CANOPY (Fr. *canapé*, It. *canope*, Med. Lat. *canopium*, gauze net, Gk. *κωνωπεῖον, kōnōpeion*, perhaps from *κῶνος, kōnos*, cone + *ὤψ, ōps*, face).

Originally a mosquito-netting in the form of a tent. In this sense the word was used as early as Herodotus (ii. 95) of the nets which the Nile fishermen hung up at night to keep off insects, and Horace (Epistle ix. 9) shows that regular mosquito-nettings were so called. Later the term came to be used of any fixed hanging or projection over a bed, couch, or throne, or of similar portable objects carried over dignitaries in processions, as the baldachin (q.v.). It has since passed into architectural terminology to designate any overhanging covering or projection above an altar, tomb, or statue, whether made of wood, stone, or metal—such a canopy as was termed ciborium (q.v.) in the Middle Ages. These features became fashionable in the Gothic period, affording an opportunity for great display of decorative richness and variety, especially in connection with sculpture. The group of Gothic canopies on the tombs of the Scaligers at Verona are the climax of a numerous series at Padua, Bologna, Verona, and other Italian cities, where they stand either against a wall or free: inside a building, or out in a square. They usually at this time end in a gable surmounting a pointed or trefoil arch, with pinnacles, crockets, and finials. There are innumerable canopies in the French Gothic cathedrals, such as Amiens, Rheims, and Chartres, surmounting even the smallest figures and forming one of the most prominent decorative features of the style not only in France, but throughout Europe. The canopy was much used in miniature form, in reliquaries, shrines, and other goldsmith work, and in works of industrial art, tapestries, stained glass, etc. The Renaissance used it but little.

CANOPY OF TOMB OF DUKE OF WELLINGTON, St. Paul's, London.

CANOSA DI PUGLIA, kȧ-nō′sȧ dē pōō′lyȧ (Lat. *Canusium*). A city in south Italy, 15 miles southwest of Barletta, on the slope of a hill, near the Ofanto (Map: Italy, L 6). The Cathedral of San Sabino, with pavement several feet below the surface of the street, was built about 1101, and contains a pulpit and an episcopal throne in marble. In an adjacent court is the tomb of Bohemond I., who died in 1111; it has bronze doors by Ruggieri of Amalfi. There is a ruined castle, built by Charles I. of Naples. A gate and the ruins of a large amphitheatre and of an aqueduct testify to the prosperity of the ancient Canusium, while from the tombs in the vicinity, excavated in 1812-13, painted vases, painted busts, marble statues, and other magnificent funereal furniture have been transferred to the museum at Naples. The town was founded by the Greeks, and till the Second Punic War was an important commercial centre. Near by is the battle-ground of Cannæ. The country produces wine and oil. Population (commune), in 1881, 19,000; in 1901, 24,169.

CANOSSA, kȧ-nŏs′sȧ. A ruined castle in north Italy, 12 miles southwest of Reggio, celebrated as the place where, in 1077, Emperor Henry IV. obtained absolution from Pope Gregory VII. after three days' humiliation (Map: Italy, E 3). Hence the expression 'Go to Canossa' is proverbially used to denote a surrender to the claims of the Church. When Bismarck inaugurated his Kulturkampf (q.v.) he publicly boasted that he would never 'go to Canossa,' but he did. The ivy-clad ruins of the castle of Canossa, which in the Eleventh Century belonged to Countess Matilda of Tuscany, Gregory's friend, and which was destroyed by the citizens of Reggio in 1255, crown the rock above the little village. From it there is a splendid view to the south of the castle of Rossena, with the Apennines in the background, and to the north, of the valley of the Po.

CANOT, kȧ′nō′, THEODORE (1807-50). An African slave-trader. He was born in Florence, Italy, and after numerous adventures made his first voyage to Africa in 1826, sailing from Havana to Bangalang, on the River Pongo, Senegambia. After several successful voyages as the owner of a slave transport, he established a slave station at Kambia, which was destroyed by fire in May, 1828. Afterwards he became the pioneer of the slave traffic at New Sestros, and in 1840 sent 749 slaves from that station to Cuba. Upon the destruction of the settlement of New Florence in 1847, which he had established several years previously, ostensibly as an agricultural and trading centre, he removed to South America, whence he went to Baltimore, Md., and finally to France, where he was appointed an official in one of the French colonies of Oceanica. Consult Mayer, *Captain Canot, or Twenty Years of an African Slaver* (New York, 1854).

CANOVA, kȧ-nō′vȧ, ANTONIO (1757-1822). An Italian sculptor. He was born at Possagno in the Province of Treviso, November 1, 1757. His family had been stone-cutters for generations, and his grandfather taught him the use of the chisel. The lad's talent attracted the attention of the Venetian Senator Giovanni Falieri, who procured him admission, in his fourteenth year, to the atélier of the sculptor Torretti, who was working in the neighborhood. Canova accompanied the latter to Venice, and after Torretti's death he studied with his nephew Ferrari. He also attended the Venetian Academy of Art, studying especially the nude; but found little to inspire him in the debased rococo of the day, and was in the main self-taught. His progress was rapid, and at the age of fifteen he executed for his patron Falieri two statues, "Orpheus" and "Eurydice." His "Dædalus and Icarus," executed in his twenty-second year, and now in the Venetian Academy, was even more famous. While still in the baroque style, these works show originality, and a careful study of the nude. In

1779, through the influence of Falieri, he received a pension from the Venetian Government, entitling him to three years' study in Rome.

He arrived there at a time when the life work of Winckelmann (q.v.) and others was bearing fruit in a new revival of the antique. Through the influence of the Venetian ambassador he was introduced into literary and artistic circles, where he formed his life-long friendship with Quatremère de Quincy (q.v.), the celebrated French archæologist and critic, who exercised great influence upon his art. He threw himself with ardor into the study of the antique, and his "Theseus Vanquishing the Minotaur" showed the fruit of these studies. Exhibited in 1782, it was epoch-making in modern sculpture, as a return from baroque to classic art. He at once rose to the rank of the first sculptor of his day. A commission for a monument to Pope Clement XIV., in Santi Apostoli, was assigned to him, and on the successful completion of this work, in 1787, he received a commission for a like monument to Pope Clement XIII., Rezzonico, in Saint Peter's, in 1795. This is one of his best works. Upon the sarcophagus is an image of the Pope kneeling in prayer, while on the left is a rather stiff figure of "Religion," with the cross, and on the right a genius, somewhat effeminate, with the torch of life reversed. Beneath are two splendid lions, the best part of the work.

During this period Canova also executed works of quite a different kind. His famous "Cupid and Psyche" (Louvre), in which the love-god, bending over, raises Psyche from the earth, although not without charm, marks what might be called a departure from the antique, because of the constrained position. More attractive is his later representation of the same subject in the Louvre, where Cupid leans confidingly on Psyche's shoulder, watching a butterfly. Among his other famous works executed before 1798 are his "Venus and Adonis," in the Naples Museum, celebrated for the caressing attitude of the goddess, and "Hebe Pouring Nectar" (Berlin), a charming specimen of girlish beauty, and different representations of the same subject in the Royal Palace, Munich. He usually executed several replicas of works like these, and those cited are either the original, or, failing these, the best-known copy.

In order to show his ability with more virile subjects he carved colossal figures of "Hercules Throwing Lichas into the Sea," now in Palazzo Torlonia, Rome, and of the two Greek boxers, "Creugas and Damoxenos," in the Vatican. Although deemed successful by contemporaries, the exaggerated action of these statues displeases modern critics, notwithstanding the great anatomical knowledge displayed, especially in the inverted figure of Lichas.

While the Pope was expelled from Rome in the revolution of 1798, Canova spent two years traveling in Austria and Germany with Prince Rezzonico. He returned, however, with the new Pope, and soon afterwards executed his "Perseus," which was purchased by the Pope, with general applause, and placed upon the empty pedestal of the "Apollo Belvedere," after which it had been modeled, in the Vatican. In 1805 the sculptor was commissioned to execute a substitute for the "Medicean Venus," which, like the Apollo, had been taken to Paris by Napoleon. His "Venus" now stands in the Pitti Palace. The "Three Graces" (Saint Petersburg) were executed in rivalry to the antique subject in Siena. Compared with the antique these works seem lacking in simplicity and sentiment; they appear artificial and sentimental, like the age of Canova. Herein lies the importance of Canova as the characteristic representative of his time. His art is a transition from the baroque to the purer classical taste of Thorwaldsen and his successors, and his position in the development of modern sculpture is like that of David in painting. He was the first to show the way to what became one of the most important factors in modern sculpture.

Canova was three times summoned to Paris by Napoleon: in 1802, 1805, and 1810. His patriotism would not permit him to accept the Emperor's brilliant inducements to remain in Paris. He pleaded with success for the support of the arts in Italy, but could not induce the Emperor to return the extorted art treasures. He carved the well-known ideal bust of Napoleon in the Pitti Palace, and in 1812 he finished a colossal marble statue, in which, according to Roman custom, the Emperor is represented nude, as a god. The original marble is lost, but an excellent bronze cast is in the court of the Brera Palace, Milan. He also represented Napoleon's sister, Pauline Borghese, as a reclining Venus, his mother Agrippina as Concordia, the Empress Maria Louisa as Concordia. In 1815, after the fall of Napoleon, he was sent as the Pope's ambassador to Paris, to bring about the return of the art treasures taken from Rome, and it was chiefly owing to his skill as a diplomat that they were returned. On his return to Rome the Pope made him Marquis of Ischia, the Academy of Saint Luke chose him perpetual president, and the Roman Senate inscribed his name in the Golden Book of the Capitol. During his embassy to Paris he visited London and saw the Elgin marbles, but warmly rejected Lord Elgin's proposal to restore them.

One of Canova's most celebrated works was the monument ordered, in 1798, by Albert, Prince of Sachsen-Teschen, for his wife, Marie Christina, Archduchess of Austria, but not completed till 1805, and erected in the Church of the Augustines in Vienna. It consists of a marble pyramid, in front of which are two groups of figures. On the left "Virtue," attended by two beautiful maidens, and bearing the cinerary urn, strides toward the door of the pyramid, followed by "Charity," leading a blind old man. On the right reclines a lion as guardian of the tomb, and a mourning genius. The composition is more adapted to a painting or relief than to a work of sculpture, and the figures, notwithstanding their beauty, have the effect of artificiality. Among his other sepulchral monuments are that of his friend Volpato, in Santi Apostoli, Rome; of the poet Alfieri, in Santa Croce, Florence; of the last three Stuarts, in Saint Peter's, Rome, and of Pius VI., a praying figure, in Saint Peter's. In these works he appears at his best. Among his classical subjects are an excellent "Paris" (1807), in Munich, "Theseus and the Centaur," in Vienna, and a "Mars and Venus," in London. His famous series of antique dancers are too studied in pose to be pleasing. One of his last works was the plaster model of George Washington, clad as an antique hero, writing his last message, which may be seen in the museum in his native town.

He seldom treated religious subjects, and when he did he represented them as beautiful, classical figures. The best-known example is a kneeling "Magdalen," in Villa Carlotta, Candenabbia.

Canova also executed a large number of portrait busts of the celebrities of his day, his friends, and especially of ideal women, as Laura or Beatrice. They are too lacking in individualization to be good portraits. He was unsuccessful in relief work, owing to his inability to make a good composition. As a painter he is of little importance. But in his proper field of sculpture he is one of the most prominent figures of modern times. No one has treated the surface of marble with more delicacy and more skill than he.

Canova died in Venice, October 13, 1822, and was buried at Passagno in a church which he had himself erected at the cost of his earnings of a lifetime. There is also a monument to him, after his own design, in the Church of the Frari, Venice, near the tomb of Titian. He was a man of lovable character, kind and charitable, especially to young and needy artists. He was inspired by a lofty patriotism, and by a touching love for his native town, to which he returned whenever possible. His house there contains a museum of his works, with the original plaster models of the most remarkable. His works were engraved by Lasinio (Pisa, 1821-25), Moses (London, 1828), and Reveil (Paris, 1825).

BIBLIOGRAPHY. An excellent contemporary biography of Canova was written by his friend, Quatremère de Quincy (Paris, 1834), with which compare the more critical *Römische Studien*, by Fernow (Zürich, 1806). Other biographies are those of his friend Cicognara (Venice, 1823); Missirini (Prato, 1827); Rosini (Pisa, 1825); D'Este (Florence, 1864); Lücke, in Dohme, *Kunst und Künstler des neunzehnten Jahrhunderts* (Leipzig, 1883); and Meyer, in Knackfuss, *Künstlermonographien* (Bielefeld, 1898).

CÁNOVAS DEL CASTILLO, kä'nô-vás dēl kå-stē'lyô, ANTONIO (1828-97). A Spanish statesman, born in Malaga, June 5, 1828. He studied philosophy and law in Madrid, entered journalism, and soon became active in politics. In 1852 he represented his native city in the Cortes as a Liberal, and two years later was appointed chargé d'affaires at Rome, where he aided in preparing the concordat between Spain and the Holy See. After being director-general of the administration from 1858 to 1861 and Under-Secretary of State in the latter year, he became, in 1864, Minister of the Interior in the Mon Ministry, and Minister of Finance and the Colonies in the O'Donnell Ministry the next year. He prepared at the time the law for the abolition of negro slavery. He was one of the last to defend in the Cortes the Liberal principles he espoused under the reactionary sway of Narvaez and Gonzalez Bravo, and was banished shortly before the revolution of 1868, in which he had no share. Returning to active life in 1869, as the leader of the moderate Conservatives, he opposed in the Constituent Cortes the project of a democratic constitution, and was one of the leaders of the movement which placed Alfonso XII. on the throne. He became president of the Council and chief of the provisional Cabinet December 31, 1874, and remained at the head of the Liberal-Conservative Ministry (the so-called Cabinet of Conciliation). He withdrew in September, 1875, before the attacks of the extreme Conservative party. He was recalled in December of the same year and charged with the direction of the first legislative elections under the new regulations. From this time he remained Premier, until 1879, when Marshal Martinez Campos returned from Cuba and took his place, retaining the principal members of the Cabinet. Martinez Campos was in turn obliged to resign in December, being defeated upon certain free-trade measures, and Cánovas returned to power. His Conservative Cabinet was overthrown in 1881. He was again Premier in 1884-85, in 1890-92, and again in 1895-97, alternating in office with Sagasta, the leader of the Liberals. In time his ideas became decidedly Conservative, and to the Radical element in Spain Cánovas appeared in the light of a reactionary. He was assassinated by an anarchist on August 8, 1897. Cánovas found time, even in the stir of Spanish political life, for considerable literary activity. In 1867 he was elected a member of the Academy of Madrid. Among his writings are a volume of poems (1887), *Estudios del reinado de Felipe IV.* (1888); *Artes y letras* (1887); *Problemas contemporáneos*, a collection of essays on economic and social questions (1884); *Biografía de Calderon* (2 vols., 1883); and several minor pieces. He also edited the works of a number of contemporary dramatists (2 vols., 1881-86), and an important historical work, the *Historia general de España* (10 vols., 1890-97). The most extended biography is by Pons y Humbert, *Cánovas del Castillo* (Madrid, 1901).

CANROBERT, käN'rô'bâr', FRANÇOIS CERTAIN DE (1809-95). A marshal of France. He was born at Saint Céré, June 27, 1809, studied in the military school of Saint Cyr, and in 1828 entered the army. After 1835 he served in Algeria. In the storming of Constantine he was one of the first to enter the breach. About the same time he received the decoration of the Legion of Honor. In 1849 he commanded a successful expedition against the Kabyles. As general of brigade, in 1850, he led an expedition through the rocky country of Narah, and destroyed the Arab stronghold there. In January, 1853, he became a general of division. The next year he commanded a division in the Crimea, and upon the death of Saint-Arnaud he assumed control of the French operations. For his services he was made Marshal of France in 1856. In 1859 he was a division commander in the Italian campaign against Austria, and took part in the battles of Magenta and Solferino. When war was declared by France against Prussia, in 1870, he was in command of the Sixth Army Corps. He was shut up in Metz with Bazaine, and became a prisoner in Germany. In 1879 he became a member of the French Senate. He died January 28, 1895. Consult Martin, *Le maréchal Canrobert* (Paris, 1895).

CAN'SO. A port of entry in Guysborough County, Nova Scotia, near the cape of the same name (Map: Nova Scotia, J 4). It has important fishing industries, a considerable trade, is the landing-place of some of the transatlantic cables, and has a United States consular agent. Population, 1500.

CANSO, CAPE. The eastern extremity of Nova Scotia and the southern boundary of the entrance of Chebucto or Chedabucto Bay (Map: Nova Scotia, J 4). It is in latitude 45° 21′ N. and longitude 61° W.

The Gut or Strait of Canso is a passage 17 miles long and 2½ miles in average breadth, connecting the inlet just mentioned with the Gulf of Saint Lawrence, and forming an island of Cape Breton. It is greatly used by local sailing vessels, but of the three channels between the Gulf of Saint Lawrence and the open ocean, it is the one that is least frequently used by European vessels.

CANSTADT, kän′stät (from *Cannstatt*, or *Canstadt*, a city of Württemberg). The name applied to a long-headed type of Quaternary man in Germany, based on a fragment of skull found among relics dug up in the year 1700 by Duke Eberhard Ludwig. Consult Mortillet, *Le préhistorique* (Paris, 1900).

CANSTEIN, kän′stīn, Karl Hildebrand, Baron von (1667-1719). The founder, by his writings and by his will, of the famous Canstein Bible Institute in Halle, Germany, for the distribution of the Scriptures at the lowest rates.

CAN′TAB, or **CAN′TABRIG′IAN** (Med. Lat. *Cantabrigiensis*, from *Cantabrigia*, Cambridge). One who is either a student or a graduate of the University of Cambridge, England.

CANTABILE, kän-tä′bė-lå (It., singable, from Lat., It. *cantare*, to sing). In music, a term which signifies in a singing or vocal manner. When placed over a passage of music, it demands an easy, flowing execution, along with a clear-cut and well-defined delivery of the chief melody, so as to bring it distinctly out against the background of the accompaniment.

CANTA′BRI (a word of Iberian origin). A rude race of mountaineers of ancient Spain. They were of Iberian origin, and lived in a district comprised in the modern provinces of Oviedo (eastern part), Santander, Vizcaya, and Guipúzcoa, on the coast of the Bay of Biscay, which derived from them its name, *Oceanus Cantabricus*. The most important of their towns was Juliobriga (the Roman form of its name). The Cantabri are described as like the Scythians and Thracians in hardihood and martial character, sleeping on the bare earth, enduring extreme pain without a murmur, and, like most savages, leaving agricultural toil to their women. Their bravery was evinced in the Cantabrian War, a six years' contest with the Romans, begun by Augustus, and concluded by Agrippa (B.C. 25-19). Tiberius afterwards stationed garrisons in the towns of the conquered Cantabri, but some portion retreated into their fastnesses among the mountains, where they preserved their independence. They are supposed by some to be the ancestors of the Basque race (q.v.).

CANTA′BRIA. The name anciently applied to a district of Spain, on the south coast of the Bay of Biscay, the home of the Cantabri (q.v.).

CANTA′BRIAN MOUNTAINS. A range of mountains extending for a distance of over 300 miles through northern Spain near the shores of the Bay of Biscay, from the west end of the Pyrenees to Cape Finisterre (Map: Spain, C 1). Less than 30 miles wide in the east in the Basque Provinces, the range broadens out toward the west and breaks up into a number of ranges, which, with their foot hills, cover the whole northwest corner of the Iberian Peninsula; at the east the main range is less than thirty miles from the coast, but this increases to about 70 miles at the west. Extreme elevations of over 5000 feet in the eastern part increase to nearly 8800 feet near the centre (Peña de Cerredo, 2678 meters); but farther west the elevations decrease from 6000 and 7000 feet in Asturias to 3000 to 4000 feet in Galicia, and rapidly diminish toward the western coast. In general, the northern and western sides are steep, forming a bold seacoast, with promontories interrupted by short narrow sections of flat coast, but on the south and east the slope is more gradual, and the descent relatively slight to the great Castilian plateau. Different portions of the Cantabrian Mountains have local names.

CAN′TACUZE′NUS (Med. Gk. Καντακουζηνός, *Kantakouzēnos*), John VI. (c.1292-c.1380). A Byzantine emperor and historian, born in Constantinople. Under Andronicus III. (1328-41), he had principal charge of the Government, and when Andronicus died he was left regent, the successor being John Palæologus, then only nine years old. Suspected by the Empress, Cantacuzenus fled from Constantinople, and proclaimed himself Emperor. Six years of civil war followed, in which the rivals employed foreign mercenaries and nearly ruined the Empire. In 1347 Cantacuzenus entered Constantinople and became joint Emperor with John Palæologus, but monopolized the royal power. He governed the Empire until 1355, when John, aided by a popular revolt, overcame him. Cantacuzenus abdicated and entered a monastery, where he wrote a history of his life and times, from 1320 to 1357, published in the collections of Byzantine historians. He strove during his regency and reign earnestly but unsuccessfully to preserve the Empire from further decline.

CANTAL, käN′tål′. A central department of France, formed out of the southern portion of the old Province of Auvergne (Map: France, J 6). Area, 2217 square miles. Population, in 1896, 224,717; in 1901, 218,941. Almost the whole area consists of the remains of an extinct volcano, intersected by gorges and diversified by peaks, the highest of which are the Plomb de Cantal (6095 feet) and the Puy Mary (5850 feet). Unimportant streams traverse the gorges. Cattle-raising is the chief industry, only about one-quarter of the department yielding arable land. Coal exists in the northwest and near Mauriac, and marble is quarried. Capital, Aurillac.

CANTALOUPE. A variety of muskmelon (q.v.).

CANTANI, kän-tä′nė, Arnoldo (1837-93). An Italian physician, born in Hainsbach, Bohemia, and educated in Prague. In 1864 he became professor of pharmacology and toxicology in Pavia; in 1867 director of the Clinical Institute of Medicine in Milan; and in 1868 professor in Naples. His investigations were devoted chiefly to such diseases as malaria, cholera, typhoid, tuberculosis, and diabetes. His efforts in behalf of the introduction of German medical methods into Italy were especially commendable. Among his principal publications are the following: *Manuale di materia medica e terapeutica* (2 vols., 1865-77), and *Manuale di farmacologia clinica* (5 vols., 2d ed., Milan, 1885-90).

CANTARINI, kän′tå-rē′nå, Simone (1612-48). An Italian painter, called the *Pesarese*, or *Simone da Pesaro*. He was born in Oropezza, near Pesaro, and after studying under Pandolfi and C. Ridolfi, entered the school of Guido Reni, of whose manner he became a close imitator. He devoted some time to studying the works of Raphael in Rome, and then went to Mantua. Humiliated by his unsuccessful effort to paint a portrait of the Duke of Mantua, he went to Verona, and died there, probably by poison. Though Cantarini approached nearer to Guido than any other of his imitators, and excelled as a colorist, he showed little originality. His etchings, too, are able and spirited, but in these his imitation of Guido is even more apparent than in his paintings. His best-known productions are the paintings: "Assumption" (Bologna Gallery); "Holy Family" (Barbaziano); "Transfiguration" (Milan); "Joseph and Potiphar's Wife" (Dresden Gallery); a portrait of Guido (in Pesaro); and the etchings "Saint John in the Wilderness;" "The Repose in Egypt;" another "Repose in Egypt," with the head of the Virgin in profile and Saint Joseph sitting near her; "Venus;" "Adonis;" "Cupid;" and "Fortune."

CANTATA, kän-tä'tå (It., song, from Lat., It. *cantare*, to sing). In music, the name of a vocal composition of either a sacred or a secular character, for solo voices, ensembles, and chorus, with instrumental accompaniment. The sacred cantata differs from the oratorio in that it is less subjective, the solos representing individuals from a community or a congregation. The secular cantata differs from opera in the absence of stage accessories, and in this respect the name 'lyric scene' is perhaps more appropriate. In mere matter of length the cantata is usually much shorter than the opera or the oratorio.

CANTEEN' (Fr. *cantine*, from It. *cantina*, cellar), MILITARY. A place of refreshment, set apart in every army post, wherever practicable, for the use of the rank and file of the troops stationed there. In the United States, the canteen system consists of a number of so-called *post exchanges*, intended to combine the advantages of a gymnasium and reading and recreation rooms. There are also in the same establishments coöperative stores and restaurants, including lunch counters, where are sold non-intoxicants and tobacco. The primary purpose of the entire undertaking is to furnish the troops, at reasonable prices, with articles of ordinary use, wear, and consumption not supplied by the Government, and to afford them means of rational recreation and amusement. When the exchange or canteen is free from debt, the net profits are distributed among the various organizations stationed at the post, for the maintenance of regimental and post athletic teams and other institutions. Previous to 1901, when the sale of intoxicants was abolished, the post exchange was permitted to sell beer and wine to the troops, the sale of spirits being, however, prohibited. This department was for the advantage of men confined by their duties to the post, or those not desiring to go outside. Strict regulations were made and enforced against possible abuses of the privilege; the beverages sold were generally the best procurable, and retailed to the soldier at the lowest possible price. As a result of public pressure, however, the canteen was formally abolished by act of Congress in 1901. There has been much controversy regarding this side of the canteen, the majority of army officers being strongly in favor of the canteen, and the several national temperance societies as strongly against it.

In England there is a canteen established in every post, barrack, and standing camp; in the latter instance each regiment stationed in the garrison or camp has its own regimental canteen, while there is, in addition, a separate establishment known as the garrison canteen. The canteen is divided into two parts—the wet canteen, where ale, porter, and mineral water are on sale; and the dry canteen, at which groceries may be purchased. A separate institution is installed in all permanent barracks, known as the 'recreation rooms.' This also is a regimental institution, and generally contains pool and billiard tables, material and accommodations for the playing of cards, chess, dominoes, and similar games, for which no charge is made. There is a room in the same building set apart for library and reading-room. In garrisons and standing camps there is a permanent library of considerable size, supplied with standard and current literature. British soldiers are allowed three-quarters of a pound of beef and one pound of bread per diem. This is the regular Government ration; all other food is purchased by the soldier, for which an average allowance of threepence halfpenny is deducted from his pay, the scale of pay being so arranged as to cover this deduction. The value of this system to the soldier is that it gives him so much increase of pay when away from his mess or regiment. All groceries are to be purchased from the dry canteen, and are retailed to the different company messes at the lowest possible rate. Individual soldiers may also purchase foods and groceries in the smallest possible quantities from the dry canteen, and cooked meals or goods from the regimental café or restaurant attached to the recreation rooms. The wet canteen is for the exclusive use of private soldiers; neither wines nor spirits are permitted to be sold, nor are men allowed to have credit with the steward, as they usually are in the dry canteen, and invariably in the restaurant. A non-commissioned officer is always on duty, to maintain order and prevent the admission of men denied its privileges. Corporals have their separate canteen, and sergeants their own mess, military discipline not permitting the intermingling of the rank and file. All moneys over and above the expenses and working capital are divided among the various regimental organizations and funds.

The canteen as an article of equipment varies in the different armies. In the United States, as in most of the armies of Continental Europe, it is a metal, leather, or wooden flask or bottle, having an average capacity of two pints, in which the soldier carries his liquid refreshment on the march, in which case it is carried slung by a strap over the shoulder. In the British Army such a vessel is called a water-bottle, while the canteen is a combination of pan, dish, and plate, constructed of tin, covered, when not in use, with a thin leather material, and carried, on the march, strapped to the valise (knapsack), pack, or waistbelt, according to the order in which the men are equipped.

CANTEMIR, kän'tye-mēr'. See KANTEMIR.

CANTERAC, kän'tå-räk', JOSÉ (c.1775-1835). A Spanish soldier. In 1818 he went to Peru. in command of a detachment sent to assist in quelling the revolt there. With General La Serna he fought several campaigns in Upper Peru.

He was a member of the cabal which in 1821 obtained the deposition of Pezuela from the viceroyalty and the appointment of La Serna to that office. As lieutenant-general and commander-in-chief of the Royalist forces, he was utterly defeated by Bolivar at the Plain of Junin. He was subsequently in command of the reserves at the final battle of Ayacucho (December 9, 1824), and, after his return to Spain, was shot during a mutiny in Madrid.

CANTERBURY, kăn′tẽr-bĕr′ĭ (AS. *Cantwaraburh*, burg of the Kents, from *Cantwara*, gen. pl. of *Cantwar*, Kentish man + *burh*, town). A municipal and Parliamentary borough, civic county, and cathedral city in Kent, England, on the river Stour, 56 miles east-southeast of London, on the highroad from London to Dover (Map: England, H 5). It is the archiepiscopal see of the primate, and the ecclesiastical metropolis of all England. The city, traversed by two main branches of the river, stands on an undulating plain between hills of moderate height. It dates from the early period of English history, and retains many of the aspects of an old town, High Street containing several mediæval houses with gabled ends and projecting fronts. One of the gates and some remains of the ancient city wall still exist, and near the wall is an artificial mound, 80 feet high, known as the Dane John (probably Donjon), from the summit of which a fine view of the country around is obtained. Connected with this mound is a public garden, laid out in the end of the Eighteenth Century. The ruins of a Norman castle also stand near the city wall.

Christchurch Cathedral, the crowning architectural feature of Canterbury, occupies almost the central point of the city. It stands amid its own precincts, to which admission is obtained through a beautiful gate of Perpendicular architecture erected in 1517. The cathedral is a magnificent building, 545 feet long and 156 feet broad at the eastern transepts. Its general aspect is of the Perpendicular style of architecture, although it represents various phases of the architectural development of several centuries. The noble proportions of its nave, choir, corona, its lofty central tower, its double set of transepts, and its northwest and southwest towers are particularly impressive, as viewed from the entrance gateway.

When Saint Augustine became Archbishop of Canterbury (about 600), he consecrated, under the name of Christ's Church, Queen Bertha's Church on Saint Martin's Hill, which had been formerly used by Roman Christians. Cuthbert, the eleventh Archbishop (740), added a church to the east of this. In the course of ages it received numerous additions, until it assumed its present magnificent form. Among those who helped to repair, enlarge, and rebuild it were Archbishops Odo (940), Lanfranc (1070), and Anselm (1093). In 1174 the choir was destroyed by fire, and a number of French and English artificers were employed to rebuild it. Among the former was William of Sens, a man of real genius, to whom the work was intrusted. The church was rich in relics. Plegemund had brought hither the body of the martyr Blasius from Rome; there were the relics of Saint Wilfred, Saint Dunstan, and Saint Elfege; while the murder of Thomas à Becket (q.v.) added a still more popular name to the list of martyrs. The offerings at these shrines, especially the last, contributed greatly to defray the expenses of the magnificent work. William of Sens did not, however, live to see its completion, dying from injuries received through a fall from the clerestory. He was succeeded by another William, an Englishman, and to him we owe the completion of the existing unique and beautiful choir, terminated by the corona or circular chapel called Becket's Crown. Gervasius, a monk, who witnessed the fire of 1174, has left an account of it, relating that the parts of Lanfranc's church which remained in his time were the nave, the central and western towers, the western transepts, and their eastern chapels.

In the Fourteenth Century the nave and transepts were transformed into the Perpendicular style of that period. The central tower (called the Angel Steeple) was carried up (1486-1504) to about double its original height, also in the Perpendicular style; it is 234 feet high and 35 feet in diameter. The northwest tower, taken down in 1834, was replaced by the existing one to match its southwest neighbor; the old tower was 113 feet high, and divided into five stories. The Norman plinth still remains on each side of the nave, in the side aisle, and portions of Norman ashlaring may still be seen about the transepts outside the west wall, and on the eastern piers of the great tower. The indiscriminate use of the round or Norman, and the pointed or early English arch, is also a very striking feature in the eastern part of the building. The Lady Chapel (now called the Dean's Chapel), with its beautiful fan-vaulted roof, stands on the north side of the church, and was built in 1368. The north transept, where Becket was murdered on Tuesday, December 29, 1170, is called the Martyrdom. Fifty years later his remains were removed from the crypt to a shrine in the newly erected Trinity Chapel, eastward of the choir. About the year 1500 the yearly offerings at this shrine amounted to $20,000; but they had then declined much in value. A mosaic pavement still remains in front of the place where the shrine stood, and the stone steps which lead up to it are worn by the knees of countless pilgrims; but during the Reformation period the shrine itself was demolished (1538) by Henry VIII.'s commissioners; and, according to tradition, the saint's remains were burned. In 1643 the building was further 'purified,' as it was called, by order of Parliament. Still, many interesting monuments remain, such as the tomb of Stephen Langton; that which is commonly, but wrongly, supposed to be the tomb of Archbishop Theobald; with those of the Black Prince, of Henry IV., of Archbishops Maphan, Peckham, Chicheley, Courtenay, Sudbury, Stratford, Kemp, Bourchier, Warham, and of Cardinal Pole. The crypt is of greater extent and loftier than any other in England, owing to the choir being raised by numerous steps at the east end. Here, in 1888, a stone coffin containing the remains of a skeleton, supposed to be Becket's, was discovered and reinterred. In 1561 this crypt was given up by Elizabeth to a congregation of French and Flemish Protestant refugees, and a French service is still held here. In 1872 the church narrowly escaped destruction for the fourth time by fire. Other build-

CANTERBURY CATHEDRAL

ings of the cathedral establishment include the deanery, the chapter-house, the treasury, the cloisters, and the baptistery; while remains of the archiepiscopal palace, the prior's house, the dormitory, and hostelries of different grades are also seen in the precincts.

Canterbury also contains a number of ancient churches, mostly built of rough flint, and other ecclesiastical buildings of considerable historical importance. The Church of Saint Martin is believed to date from pre-Saxon times, and in it King Ethelbert is said to have been baptized by Saint Augustine. Near by is the Benedictine Abbey of Saint Augustine, which has been restored and added to, and is now occupied as a missionary college in connection with the Anglican Church. The Church of Saint Dunstan contains the burial-vault of the Roper family, in which the head of Sir Thomas More is said to have been placed by his daughter. The secular buildings of interest are the guildhall, containing a collection of ancient arms, the corn exchange, military barracks for cavalry and infantry; the keep of the old castle, now utilized for gasworks; King's School, founded, according to tradition, in the Seventh Century, and remodeled under Henry VIII.; Saint John's Hospital, founded by Archbishop Lanfranc; and, in the Chequers Inn, scanty traces of the original hostelry of the pilgrims in Chaucer's *Canterbury Tales*, the 'dormitory of the hundred beds' having been destroyed by fire in 1865. Besides the two schools already mentioned, the educational institutions include the Simon Langton Schools, opened in 1882; the Clergy Orphan School, a mile outside the city; and a museum and art school.

The city carries on a considerable trade in hops and corn, has important malting and brewing establishments, and a specialty in the manufacture of brawn. The manufacture of silks, formerly a thriving industry, has been replaced by manufactures of damask linen and worsteds. The economic branch of Canterbury's history is interesting. The city returns one member to Parliament, and is governed by a mayor, aldermen, and councilors. The civic spirit has always been distinguished by a combative tenaciousness for its rights, and by progressiveness. The city owns real estate, markets, and electric power and lighting works, operated by the heat of a destructor, which consumes the city refuse; it provides technical instruction and maintains a museum, school of art, cemetery, and an irrigation farm, where the city sewage is deposited, chemically treated, and manufactured into manure and sold for fertilizing purposes.

Canterbury, the Roman *Durovernum*, was built on a ford of the river Stour, at the point where roads from the three fortified Roman ports—Dover, Lynne, and Richborough—joined the great Roman highway through Britain, later known as Watling Street. It subsequently became the Saxon *Cantwaraburh* (burgh of the men of Kent), the capital of that southeastern kingdom, and the centre from which England was Christianized. The Danes, in the Ninth, Tenth, and Eleventh centuries, often ravaged and burned the city. After the murder and canonization of Thomas à Becket, Canterbury became of considerable importance as a place of pilgrimage. The poet Chaucer, who died in 1400, has furnished interesting contemporary accounts of these religious excursions in his *Canterbury Tales*. In 1215, during his invasion of England, Louis, Prince of France, took the castle. In 1381 Tyler's Rebellion (q.v.) originated in Canterbury. In 1538 the cathedral and other ecclesiastical institutions underwent extensive spoliation at the command of Henry VIII., and later suffered from fresh exactions levied by Edward VI. During the Civil War Canterbury was the scene of exciting struggles between the Royalists and the victorious Parliamentarians, at whose hands the cathedral sustained considerable mutilation. Population, in 1891, 23,000; in 1901, 24,900. Consult: Willis, *Architectural History of Canterbury Cathedral* (2 vols., London, 1845-69); Hook, *Lives of the Archbishops of Canterbury* (12 vols., London, 1860-76); Brent, *Canterbury in the Olden Time* (London, 1879); Jenkins, *Diocesan History of Canterbury* (London, 1880); Stanley, *Canterbury Cathedral* (Philadelphia, 1895); White, *Canterbury Cathedral* (London, 1896); Evans and Goldney, *Canterbury* (Dover, 1899); "Canterbury as a Civic Centre," in *Municipal Journal*, Vol. VIII. (London, 1899), Snow, "English History in Canterbury Cathedral," in *Canadian Magazine*, Vol. XIV. (Toronto, 1900).

CANTERBURY. A provincial district of about 14,040 square miles, on the east coast of South Island, New Zealand, with Christchurch (q.v.) as its capital and Lyttelton (q.v.) as its port (Map: New Zealand, C 5). Population, in 1891, 128,471; in 1901, 143,040.

CANTERBURY BELLS. A name given to Campanula medium, a biennial plant growing to a height of 1 to 4 feet. The stems are erect, very leafy, and the corolla is large, bell-shaped, and inflated. A variety, *Calycanthema*, which is extensively cultivated, has its calyx colored like the corolla, and is commonly known as cup-and-saucer, from the shape of the flower. Double-flowered forms are common, in which several cups are formed within one another. The Canterbury bells are among the most extensively cultivated of all the Campanulas (q.v.).

CANTERBURY COLLEGE. See Oxford University.

CANTERBURY TALES. See Chaucer.

CAN'THAREL'LUS. See Fungi, Edible.

CANTHAR'IDES. See Blister-Beetle.

CANTICLES (Lat. *canticulum*, little song, from *canere*, to sing. The name of the book is in Lat. *canticum canticorum*, song of songs, Gk. ᾆσμα ᾀσμάτων, *asma asmatōn*, Heb. *shir hashshirim*). One of the books in the Hebrew canon. There is no reference to it in the Old Testament, the Old-Testament Apocrypha, Philo, Josephus, or the New Testament. The age of the Greek version is unknown, but it cannot well be later than the First Century A.D. The book is first mentioned in the Mishna (edited about A.D. 200). At the assembly of Jamnia (about A.D. 100) the rabbis are said to have been of different opinion as to its canonicity, some holding that it was not a sacred book, rendering the hands unclean so that they must be washed after contact with it (see Bible, *Canon*), while others strongly maintained its religious value, among these particularly R. Akiba, *Yadayim*, iii. 5, *Eduyoth*, v. 3. This scholar denounced the men who would sing the songs of Canticles in wine-houses. *Tosephta*

Sanh. xii. It is evident that the allegorical as well as the literal interpretation was in vogue in the First Century A.D. Probably the ascription of Canticles to Solomon, the philosopher *par excellence*, caused the conviction that it must have a profound significance; and the allegorical method of the day led men to find in it a description of Jehovah's love for His people Israel. This interpretation passed from the Synagogue to the Church, with the modification that the bridegroom became Christ and the bride either the Church or the individual soul. Origen understood the poem very much as Akiba had, and Cocceius found in it the history of the Church down to the Synod of Dort in A.D. 1618, just as the Targumist had found the history of Israel down to the exile of B.C. 586. Some adherents of this allegorical interpretation, such as Vatablé, Bossuet, and Lowth, assumed a double sense, a description of earthly love at the same time intended to be typical of spiritual love. In defense of this view, it has been argued that the poem may have precisely the mystical sense that has been claimed for the love-songs of Hafiz and Jayadeva's *Gitagovinda*. It is not altogether inconceivable that a work which has furnished so rich nourishment to Christian mysticism itself may be the product of a similar Jewish mysticism. But where the mystical tendency and the allegorical method were most in evidence, in Philo's works, there is no trace of Canticles or anything like it. At the present time there is a practical agreement among scholars that the love depicted is solely that of man and woman.

The first Christian interpreter who discarded all allegorizing was Theodore of Mopsuestia (died 429). For this he was condemned in 551. Luther, curiously enough, looked upon Canticles as a political allegory teaching obedience to civil authority. The secular character of the poem was fully recognized by Sébastien Chateillon (1544). For this offense he was driven out of Geneva by Calvin. Luis de Leon (died 1591) was incarcerated by the Inquisition five years for suggesting in his Latin translation a similar view. Hugo Grotius, somewhat timidly, and Jean le Clerc, more decidedly, maintained that earthly love was depicted in the song. Observing what he deemed the immorality of some of the lyrics, J. D. Michaelis threw the book out of the canon, and J. S. Semler likewise questioned its canonicity. The conception of canonical authority prevalent in their time has now been generally abandoned; and the highly spiced descriptions of sexual passion have been justified, first by the supposed purpose of the author to protest against Solomon's harem life, and then by the assumption that wedded love is portrayed.

But is this poem of earthly love a drama or a mere collection of lyrics? And is the love described that of husband and wife, or of men and women who follow the promptings of passion regardless of social conventions? Already Origen says of Canticles, "Dramatis in modum mihi videtur." Cornelius a Lapide (Van den Steen, died 1637) divided the poem into five acts. Lowth (1753) regarded it as an imperfect drama lacking a regular plot. J. Wachter (1722) and J. F. Jacobi (1771) sought to indicate a plot. While the former made Solomon and the Shulamite the chief characters, the latter discovered in addition a shepherd lover. Delitzsch (1851-75) gave the classical expression to what has been called the 'king theory,' while the 'shepherd theory' was especially developed by Velthusen (1786), Stäudlin (1792), and Ewald (1826, 1839, 1842). Through Ewald, this theory became widely accepted. Böttcher (1850) even more decidedly made the poem a modern operetta enacted on the stage. Hitzig (1855) discovered Solomon's wife, and Hirzel (1888) was able to find two shepherds and two shepherdesses. The latest critic who has accepted this view is Duhm (1902). He regards Canticles as an operetta resembling the mediæval miracle plays, and divides it into twenty lyrico-dramatic passages. The plot is simple; true love wins the day over all the efforts of Solomon to part the lovers and make the maid of Sharon his favorite wife. The songs are sung partly by individuals, such as the Shulamite, Solomon, and the shepherd, partly by choruses of harem-ladies, women of Zion, bridesmaids, and kinsfolk. Several objections have been urged against this theory. The ancient Hebrews possessed no theatre, and the Semitic race has produced no great dramatic genius; there is no intelligible plot in Canticles; there is a lack of verisimilitude in the King's character and behavior; there is something absurd in the idea that the heroine's answers to Solomon are in reality addresses to her absent lover; the necessity of putting the Shulamite to sleep on the stage, to dream through entire scenes, is not less embarrassing.

Bossuet (1693) and Lowth thought that Canticles might have been written for a royal wedding, and divided it into sections corresponding to the days of the feast. Renan (1869) made the important suggestion that it may be the libretto of a simple play performed privately at some rural wedding, where the singers took the parts of Solomon's guards, ladies of Jerusalem, and others. To this view he was led by the accounts of Schefer of such performances seen by him at Damietta and in Syria. Similar observations made by Wetzstein in the neighborhood of Damascus caused this scholar to think that Canticles is not a dream, but a collection of wedding songs, intended to set a standard of decency and good taste for wedding poets to follow. Certain features of the Syrian wedding, such as the bridal couple playing king and queen, the sword-dance of the bride, and the *wasf* or song in praise of the bride, particularly impressed him (1873). Wetzstein's view was accepted by Stade (1887), and particularly elaborated by Budde (1894-98), Siegfried (1898), and Cheyne (1899), who strongly emphasize that the poems throughout describe wedded love. This theory, though more probable than the earlier views, is not wholly free from objection. It is difficult to see how a natural exegesis can find wedded love described in scenes that present the husband *ex hypothesi*, as knocking at his wife's window and being refused admittance on the ground that she is not dressed, or the heroine as roaming through the streets of the city at midnight in search of him, or expressing a wish that he were her brother that she might kiss him without being reproved. The necessity of resorting to dreams is again suspicious.

According to the theory of Herder (1778), accepted by Eichhorn, Goethe, De Wette, Döpke, Magnus, Diestel, and others, Canticles is simply an anthology of lyrical forms describing the love of man and woman in all its different stages of development. This would be a most plausible theory were it not for the incidental dialogue, the references to King Solomon and the Shulamite, and the light thrown upon wedding customs in Syria by the observations of Schefer and Wetzstein.

A wholly satisfactory hypothesis must recognize the element of truth in each of these theories. There is, indeed, in Canticles a use of metaphor amounting at times to allegory. He who thinks that by gardens, fountains, trees, fruits, and wine these objects in nature are always meant, will not understand the songs. There is frequently an unmistakable *double entendre.* The love of the King and of the Shulamite is unquestionably of the same character. Yet there are beyond a question rustic lovers in the poem. However great the distance between Canticles and the Greek and Hindu drama, these country folk playing king and queen, bodyguard and harem in the wedding-week, seem to present a song-play that may be at the same time a reflection of Greek influence in the Decapolis and the abortive attempt at creating a native drama. But there is no movement of the action, no plot, no unity. As already Richard Simon (1628) and after him Herder recognized, the songs are clearly of different provenience. They do not all describe the love of a married couple. There are curious survivals shimmering through the poem of earlier forms of domestic life, polyandry, polygamy, promiscuity, and of sexual aberrations such as the *basium Florentinum*, pointed out by J. D. Michaelis in his *Or. und Exeg. Bibliothek* (1774), page 169 ff.

It is now generally acknowledged that Solomon cannot have been the author of Canticles. The language itself, with its Neo-Hebraisms, Aramaisms, and Persian and Greek loan-words, indicates with sufficient clearness that the book is one of the latest in the Hebrew canon. Graetz regarded the author as dependent upon Theocritus (Third Century B.C.). Cheyne also thinks of the reign of one of the earlier Ptolemies. Siegfried is willing to go into the Second Century. Winckler has suggested that the book was written by a Jew in Damascus in the period of the Nabatæan kings. There is indeed much that points to the trans-Jordanic region, and particularly to the Decapolis. It is of no small significance that it is among the Greek lyric poets of the Decapolis that we find the first impassioned expression of a sense of beauty in nature. The reign of Aretas III. or Aretas IV. (c. 85-63 B.C.) is, perhaps, the most probable date. Together with a strong emphasis upon the divine rights of passion, the supreme value of pure attachment between man and woman, it is the keen sense of beauty in nature that will always give to Canticles a distinguished place in ancient Hebrew literature. Consult: Herder, *Das Lied der Lieder* (Berlin, 1875); Ewald, *Dichter des alten Bundes* (Göttingen, 1839); Delitzsch, *Hoheslied und Koheleth* (Leipzig, 1875); Renan, *Le cantique des cantiques* (Paris, 1860); Siegfried, *Prediger und Hoheslied* (Leipzig, 1898); Cheyne and Black, *Encyclopædia Biblica* (Leipzig, 1899).

CANTILEVER (probably Lat. *quanta libra*, of what weight, from *quanta*, abl. fem. sing. of *quantus*, how much + *libra*, weight. The word may possibly be derived from Eng. *cant*, angle, and *lever*). The part of a beam or girder which projects bracketwise beyond the point of support, as the brackets supporting a balcony or the projecting girders which carry a sidewalk outside of the trusses of a bridge. In bridges, a cantilever is a girder or truss anchored to a shore abutment and resting on a second out-shore pier or tower beyond which it projects. Two such cantilevers extending out from the opposite shores of a stream and united by a truss constitute a cantilever bridge. For examples of such structures, see BRIDGE.

CANTIRE, kăn'tīr', or **KINTYRE**. A peninsula in Argyleshire, Scotland, 43 miles long, with an average width of 6½ miles (Map: Scotland, C 4). It extends north and south between Arran Isle and the Atlantic, and is united at the north end with the mainland by the isthmus of Tarbet, a mile broad, across which the cutting of a canal is contemplated. The southwest point, the Mull of Kintyre, Ptolemy's *Epidium Promontorium*, is crowned by a lighthouse 297 feet above sea-level, visible 24 miles. Consult White, *Archæological Sketches in Scotland* (*Kintyre*) (London, 1873).

CANTON' (Chinese *Kwang-chow-fu*, or *Shengsheng*). One of the chief commercial cities of China, capital of the Province of Kwang-tung and residence of the viceroy for the two provinces of Kwang-tung and Kwang-si. It is situated on the Chu-Kiang or Pearl River, about 70 miles from the sea, in latitude 23° 7' 10" N., and longitude 113° 14' 30" E. The climate is moderate and not unhealthful for Europeans. Canton consists of the city proper, inclosed by a wall, and the suburbs extending along both sides of the river. There is also a large population living in boats on the river. The city proper is about 6 miles in circumference and is encircled by a brick wall laid on granite and sandstone foundations, and measuring about 20 feet in thickness and from 25 to 40 feet in height. An inner wall divides the inclosed city into the new and the old city. The streets are long, narrow, and clean in comparison with the streets in most of the Chinese cities. The houses are mostly low, very few above two stories in height, and built of brick, stone, or wood. The pagodas are numerous and extensive; one of them, situated on the island of Honam on the opposite shore of the river, covering an area of seven acres. There is also a Mohammedan mosque. Among other interesting buildings are the Examination Hall, the arsenal, and the mint. There are a Gothic cathedral erected by the French mission: a hospital, founded in 1835 by the American mission; and an ancient foundling asylum.

Canton is one of the principal seats of the Chinese silk industry; it also produces cotton goods, embroideries, paper, and some porcelain and metal ware. Owing to its advantageous position, Canton very early attracted the attention of foreign merchants. The Arabs are believed to have traded there as early as the Ninth Century. The first attempt by European Powers to open commercial relations with Canton was made in 1517, when a Portuguese mission was sent to Peking with such an object in view. The Dutch began to trade with the city later in the century, but were soon superseded by the British, who, after several unsuccessful attempts, established a factory in Canton in 1684, when the entire foreign trade of China was confined to that city. From 1684 to 1834 the Chinese trade with Great Britain was a monopoly of the East India Company, while the British trade with China was confined to a few 'hong' merchants, who acted as intermediaries in all matters affecting the Government and aliens. The aversion of the natives to foreigners, coupled with the interference of the Chinese Government with the importation of opium (amounting, in 1837, to 30,000 chests), brought about a declaration of war by Great Britain in 1839. In 1841 the Bogue forts, guarding the approach to Canton, were reduced by the British, and the occupation of the city itself was averted only by the payment of a ransom of $6,087,500. The conclusion of the Treaty of Nanking in 1842, by which four more ports were opened to British trade, had a detrimental effect on the commerce of Canton. Fresh outbreaks on the part of the natives in 1856 were followed by the military occupation of the city by French and British troops from 1857 to 1861, since when Canton has been practically open to foreign trade and residence.

The commercial relations of the United States with Canton and China date from 1784. The exportation of cotton from the United States to Canton began in the last decade of the Eighteenth Century, and the product has since become one of the chief exports from the United States to China. The chief exports from Canton are tea, silk, matting, firecrackers, oils, paper, and preserves. The chief imports are cotton and cotton goods, woolen and metal goods, opium, petroleum, etc. The direct foreign imports and exports of Canton in 1900 were nearly $9,900,000 and over $13,600,000 respectively. The harbor is shallow. Large vessels are obliged to discharge their cargoes at Whampoa, over 10 miles from Canton, from which place they are brought to the city by lighters and steam launches. The annual shipping of Canton amounts nearly to 4,000,000 tons, of which nearly three-fourths is in British bottoms. Canton has steam communication with Hong Kong, Macao, and Shanghai. Estimates of the population vary all the way from 500,000, given in a native official report of 1895, to 2,500,000, an estimate of the Customs Trade Report.

CAN'TON. A city in Fulton County, Ill., 28 miles southwest of Peoria, on the Chicago, Burlington and Quincy and the Toledo, Peoria and Western railroads (Map: Illinois, B 3). It is the centre of a fertile agricultural district, and has coal-mining interests, extensive agricultural-implement works, and cigar-factories, as well as foundries, tile, brick, and marble works, etc. The city contains a public library, founded in 1893. Settled about 1832, Canton was incorporated first in 1849. Under a charter of 1892, the government is vested in a mayor, elected every two years, and a city council. There are municipal water-works. Population, in 1890, 5604; in 1900, 6564.

CANTON. A town, including several villages, in Norfolk County, Mass., 14 miles southwest of Boston, on the New York, New Haven and Hartford Railroad (Map: Massachusetts, E 3). It has a public library of about 11,000 volumes. The manufactures include iron and brass wares, knit goods, felt goods, sewing-silk, blacking, stove-polish, leather-dressing, sizing compounds, etc. Settled about 1690. Canton was set off from Stoughton and incorporated in 1797. The government is administered by town meetings. Population, in 1890, 4538; in 1900, 4584. Consult Huntoon, *History of the Town of Canton* (Cambridge, 1893).

CANTON. A city and county-seat of Madison County, Miss., 21 miles north by east of Jackson, on the Illinois Central Railroad (Map: Mississippi, E 5). It is the chief city of the county, and has cotton gins and compresses, cottonseed-oil mills, ice-factory, and manufactures of farming implements, lumber, boxes, etc. Population, in 1890, 2131; in 1900, 3404.

CANTON. A town in Lewis County, Mo., 157 miles northwest of Saint Louis, on the Saint Louis, Keokuk and Northwestern Railroad (Map: Missouri, E 1). Advantageously situated on the Mississippi River, it is an important lumber-shipping place, and has planing-mills, button-factories, canning-works, and flour-mills. The town is the seat of Christian University (Christian), organized in 1853. Settled about 1831, Canton was incorporated twenty years later; the charter now governing the town dates from 1873, and provides for a mayor, elected annually, and a board of trustees. The town owns and operates its water-works and electric-light plant. Population, in 1890, 2241; in 1900, 2365.

CANTON. A village and county-seat of Saint Lawrence County, N. Y., 18 miles southeast of Ogdensburg, on the Grass River, and on the New York Central and Hudson River Railroad (Map: New York, E 1). It is the seat of Saint Lawrence University (Universalist), opened in 1858, and contains notable court-house and opera-house buildings. The village has large saw mills, and is engaged in the building of small boats and launches, skiffs, and sailing yachts. Good water-power is derived from the river. Canton was settled about 1830, and was incorporated in 1886; it was the home of Gov. Silas Wright, who is also buried here. The village owns and operates its water-works. Population, in 1890, 2580; in 1900, 2757.

CANTON. A city and county-seat of Stark County, Ohio, 60 miles south-southeast of Cleveland, on the Nimishillen Creek, and on the Cleveland, Canton and Southern, the Baltimore and Ohio, and the Pennsylvania railroads (Map: Ohio, H 4). It is in a fine wheat-growing district, and coal, limestone, and clay for pottery and brick are found in the vicinity. Its manufactures include watch cases and movements, iron bridges, and roofing, threshers, engines, mill machinery, plows, bookcases, steel, steel cars, cutlery, saddlery hardware, stoves, safes, woolens, presses, pottery, tiles, and various kinds of brick; and besides these articles, large amounts of grain and coal are exported. Among the more prominent features of the city may be noted the United States Government building, city hall, county court-house, county workhouse, high school, Aultman Hospital, Nimisilla Park, and two monuments erected to the soldiers of the Spanish-American War. Canton was first settled about 1805, was incorporated as a village in 1822, and was chartered as a city in 1854. It was the home of President McKinley. Under the charter now in operation, the mayor holds office for two years, and the city council is elected by wards.

The school board is chosen on a general ticket for a term of two years. The executive appoints the city board of elections, and, with the consent of the council, sewer, police, and park commissioners. The board of health is chosen by the council, and other administrative offices are filled by popular election. The city's income and expenditures exceed considerably $500,000 annually. The principal items of expense are $20,000 for the police department, including amounts for police courts, jails, reformatories, etc.; $25,000 for the fire department; and $110,000 for schools. Population, in 1860, 4041; in 1880, 12,258; in 1890, 26,189; in 1900, 30,667.

CANTON. A city and county-seat of Lincoln County, S. D., 70 miles north by west of Sioux City, Iowa, on the Big Sioux River, which affords fine water-power, and on the Chicago, Milwaukee and Saint Paul Railroad (Map: South Dakota, J 6). It is the seat of Augustana College and of the United States Government asylum for insane Indians. The city contains several grain-elevators, and exports flour, grain, and live stock. Population, in 1890, 1101; in 1900, 1943.

CANTON, *Fr. pron.* kän'tôN' (Fr., from Med. Lat. *canto*, *cantonum*, ultimately probably from Gk. *κανθός*, *kanthos*, felloe of a wheel). In political geography, a division of territory constituting a separate government or State. It is the name given to the twenty-two States in Switzerland. In France the canton is a judicial district, comprising, as a general rule, a number of communes, but constituting in the case of very large cities only a part of such commune.

Canton in heraldry is a corner of the escutcheon cut off by straight lines in the dexter or sinister chief.

CAN'TON, John (1718-72). An English physicist. For his paper entitled *A Method of Making Artificial Magnets Without the Use of Natural Ones*, he was honored with a gold medal by the Royal Society in 1751. He and Franklin almost simultaneously discovered that some clouds were charged with positive and others with negative electricity. Canton determined the quantity of electricity stored up in Leyden jars, demonstrated the compressibility of water, and made several other important contributions to physical science.

CANTONI, kän-tō'nē, Carlo (1840—). An Italian philosopher, born at Groppello in the Province of Pavia. He studied at the universities of Turin, Berlin, and Göttingen, and held professorships at Turin and Milan until 1878, when he was made professor of philosophy at the University of Pavia. Although a disciple of Kant, he sought to modify many of that philosopher's doctrines, and combated his theory of the dualism of *phenomenon* and *noumenon*. His works include *Giovanni Battista* Vico, *studii critici e comparativi* (1867); *Corso elementare di filosofia* (3 vols., 1870, frequently re-edited); *Emanuele Kant* (3 vols., 1879-84)—Vol. I. *La filosofia teoretica;* Vol. II. *La filosofia pratica;* Vol. III. *La filosofia religiosa, la critica del giudizio, le dottrine minori*—and *Psicologia* (2d ed., 1897). Consult: Werner, *Kant in Italien* (Vienna, 1881); and his *Die italienische Philosophie des 19. Jahrhunderts* (Vienna, 1886); and de Gubernatis, *Dictionnaire international des écrivains du jour* (Florence, 1889).

CAN'TONMENTS (Fr. *cantonnement*, from *cantonner*, to quarter, from *canton*, quarter), Military. A more or less permanent camp or district, in which soldiers are quartered. In Europe, before the era of railroads and modern scientific warfare and transport, there would be frequently long intervals between active operations, caused principally by the state of the weather, winter, etc.; impassable roads; local or general armistices; and the constantly recurring necessity of waiting for supplies. In such intervals the troops would go either into a permanent camp of huts, or else be quartered in the houses and villages of the district, when they were said to be in cantonments. Its most modern military usage is in India, where the cantonment is practically a military town, and, in the majority of instances the district inside whose borders live the European part of the population, civil as well as military. Cantonments are built throughout British India, the larger examples containing barracks for European cavalry, infantry, and artillery; rows of bungalows or houses, each, as a rule, inclosed in a garden, for the officers; rows of huts for the native troops; magazines, gymnasiums, and parade grounds; public offices and administration buildings; and a bazaar, more particularly for the accommodation of the native troops.

CANTÙ, kän-tōō', Cesare (1804-95). A distinguished Italian historian and novelist, born at Brivio, near Milan, December 5, 1804. He was educated at Sondrio, where, at an early age, he became instructor in *belles-lettres*, leaving after four years, to accept a professorship, first in Como, and later in Milan. The liberal tendencies expressed in a work published in 1832, *Lombardy in the Seventeenth Century: An Historical Commentary on the "Promessi Sposi" of Manzoni*, resulted in an imprisonment of thirteen months. Cantù spent his enforced leisure in describing the sorrows of prison life in the form of a widely read historical romance, *Margherita Pusterla* (1837). His great work is the *Storia universale*, in 35 vols. (Turin, 1837, sq.), based largely upon French and German sources, but uniformly colored with a strong clerical bias. Next in importance is his *History of the Italians*, in six volmues (Turin, 1854), and the following also deserve mention: *History of Italian Literature* (1865); *Independence of Italy* (1872); *Milan: A History of the People for the People* (1871); and many monographs upon Parini, Beccaria, Monti, and other men of letters. Cantù became director of the archives of Lombardy in 1874. He died in Milan, March 11, 1895. Consult Bertolini, *Cesare Cantù e le sue opere* (Florence, 1895).

CAN'TUS FIR'MUS (Lat., firm song). The principal voice or melody in concerted music. It was generally assigned by the contrapuntal writers of the Fifteenth and Sixteenth centuries to the tenor, against which the other voices executed the counterpoint (*cantus figuratus*). The cantus firmus may be assigned to any voice.

CANT'WELL, Doctor. The title-character in Bickerstaff's *Hypocrite*. He is a sort of English Tartuffe, and was suggested by Dr. Wolf in Cibber's *Non Juror*.

CANUCK'. A name applied in the United States to any Canadian, while the English Canadians use it to denote a Canadian of French birth. According to Norton's *Political American-*

isms, it was first applied by the French to the English, and is a corruption of Connaught. Some scholars, however, believe it to be of Indian origin.

CAN′ULE′IUS, Gaius. A Roman tribune of the people. In B.C. 445 he proposed the *Lex Canuleia*, a law establishing the right of intermarriage between the patricians and plebeians. He also proposed that one of the two consuls should be chosen annually from among the plebeians, but this proposal was not carried, and it was resolved instead that military tribunes with consular power should be elected from either the patricians or plebeians in place of the consuls. Consult Livy, iv. 3; and Cicero, *De Republica*, ii. 37-63.

CANUN, kȧ-nōōn′ (Arab. *qānūn*, borrowed from Gk. *κανών*, *kanōn*, straight bar, rule, norm). A Turkish musical instrument, provided with gut strings—a variety of the dulcimer or zither. The sounds are produced by striking the strings by means of plectra—tortoise-shell thimbles ending in pointed pieces of cocoanut. This instrument is a great favorite in the seraglios.

CANUTE, ka-nūt′, or **CNUT**, knōōt (c.994-1035). King of the English, Danes, and Norwegians, and known as the Great. He was the son of Sweyn, King of the Danes, and on the death of his father, in 1014, was proclaimed King of England by the warriors of the Danish fleet who were then ravaging the country. The Witan, however, summoned the old King, Ethelred, from his exile in Normandy, where he had been driven by Sweyn, and Canute was forced to flee to Denmark. He returned in 1015 with a powerful fleet and within a year made himself master of all England, save London, being chosen King by a rump Witan after the death of Ethelred in 1016. The citizens of London proclaimed Edmund Ironside, son of Ethelred, King, and a fierce contest ensued in which six battles were fought and London was twice besieged, the decisive engagement occurring at Assandun in 1016. Though Edmund was defeated, Canute, to avoid further resistance on his part, agreed to share the sovereignty with him, the south of England going to Edmund and the north to Canute, with the stipulation that on the death of either the full power was to revert to the survivor. Edmund Ironside died in 1017, not without the suspicion of foul play on the part of Canute, who lost no time in securing his position as sole ruler of England. He had always been noted for his excessive cruelty, and now, to remove all potential rivals out of his way, he entered upon a rapid but systematic course of murder and persecution. By 1018 he had thoroughly pacified the country and considered himself strong enough to dispense with the support of the fleet, which he sent home to Denmark, keeping only the crews of forty ships as a sort of bodyguard. The character of Canute's rule now underwent a remarkable change. Mildness was substituted for severity, and respect for the laws for violence. The ancient customs of the country were confirmed and elaborated, and the administration of justice was securely founded. Englishmen were admitted to the highest offices in the land, this being the time when the Saxon Earl Godwin (q.v.) laid the beginnings of his great power. Canute showed himself especially kindly to the clergy, whose rights he scrupulously respected and whose favor he gained by numerous benefactions to churches and monasteries. With the mass of the people he was popular on account of his liberality and an air of bluff good-nature which he knew well how to assume. In 1026-27 he made a pilgrimage to Rome, describing the events of his journey in a letter to his people replete with moral exhortations and expressions of religious humility, which may be the result either of great naiveté or of fine histrionic skill. Canute had become King of Denmark after the death of his brother Harold in 1018, and in 1028 he became ruler, also, of Norway. Together with his conquests in the Wendic lands of Germany, he was, therefore, the master of a powerful northern empire, which, however, fell to pieces at his death. This occurred at Shaftesbury, November 12, 1035. As King of England, Canute had displayed high talents for rule. By nature cruel and violent, he knew how to subordinate his passions to the interests of his government and his people: and, though practically a heathen at the time of his accession to the throne, he succeeded in winning the favor of a Church which has associated one of the most beautiful of mediæval legends, that of the King and the rising tide, with his name. Consult: Freeman, *The Norman Conquest*, Vol. I. (Oxford, 1870); and Green, *The Conquest of England* (London, 1883).

CANUTE IV., The Saint (? -1086). King of Denmark after 1080. He was distinguished as a warrior and a builder of churches. He attempted to invade England in 1085, but was murdered by rebels, on July 10, 1086, and was canonized in 1100. He is the patron saint of Denmark.

CANVAS (OF. *caneras*, Med. Lat. *canneraşium*, from Lat. *cannabis*, hemp). A strong, coarse cloth made of cotton, flax, or hemp. Canvas is used (1) on board ship for sails, awnings, hatch-hoods, boat-covers, tarpaulins, etc. Flax canvas is used for the sails of large vessels. It is woven in cloths 24 inches in width and 40 yards long, and is of several weights, denoted by numbers from 1 to 9. The heaviest, which is called number 1, is used for storm-sails, courses (foresail and mainsail of square-rigged vessels), and topsails, but numbers 2 and 3 are also used for all of these except the storm-sails. The lighter weights are used for jibs, upper staysails, topgallant-sails, royals, etc. Cotton canvas is used for boat-sails, hammocks, etc. The term canvas is used in a figurative sense for the sails of a ship, *under canvas* signifying under sail—i.e. under way, propelled by sails. See Sail.

(2) The canvas used by artists is commonly of linen, varying in density and thickness according to the size of the painting to be made. This is stretched upon a wooden mortised frame, which is called a stretcher, in the four inside corners of which are slits for receiving triangular wooden wedges. These wedges are called keys, and after the canvas is stretched they may be driven in, in order to tighten the canvas itself. Certain sizes of canvas, being in greater request than others, are kept ready stretched on frames. Those used for portraits are known by the names of *kit-cat*, which measures 28 or 29 inches by 36; *three-quarters*, 25 by 30 inches; *half length*, 40 by 50; *Bishop's half length*, 44 or 45 by 56; *Bishop's whole length*, 58 by 94.

CANVASBACK. An American fresh-water duck (*Aythya vallisneria*), regarded as superior to all others for food. It breeds from Dakota northward, but most numerously in the far north, making its nest on the ground, in a marsh, and laying six to ten greenish-buff eggs. (For illustration, see Plate of DUCKS, WILD.) The canvasbacks begin to come southward along inland waterways in November, and spread over all the Middle and Southern United States. They are attracted in greatest numbers to the extensive marshes and river flats about Lakes Huron and Erie and around Chesapeake Bay, but are also irregularly numerous wherever their favorite food grows in the Mississippi Valley and on the 'slews' of the plains. This food is the wild celery (*Zostera vallisneria*), which grows densely on fresh-water shoals in from 7 to 9 feet of water, like a tall grass, the root of which is white and has some resemblance to small celery. "Wherever this plant grows in abundance, the canvasbacks may be expected," says Wilson: "while in waters unprovided with this nutritious plant they are altogether unknown. . . . They float about these shoals, diving and tearing up the grass by the roots, which is the only part they eat." It is not quite true to say that they will eat nothing else, for celery is not always available. They are extremely shy, quick and strong in flight, and remarkably expert in diving, so that all the skill and strategy at the disposal of the gunner is necessary to success in shooting them. They are so relentlessly pursued, however, that their numbers are far less in all their haunts than formerly; and very many of the alleged canvasbacks sent to market are really redheads (q.v.), a closely related and nearly as good duck, of similar habits, but less strongly addicted to the celery diet. The male canvasback has a head reddish, but much obscured with dusky tints, while that of the redhead is clear, bright chestnut, and the bill is blackish (not blue). The back and sides are whitish (less dark than that of the redhead), marked with sparse, wavy lines and dots, suggesting the surface of coarse canvas. The fore part of the body, rump, and tail-coverts are black; speculum, bluish-gray; length, about 20 inches. Consult Elliott, *Wild Fowl of North America* (New York, 1898).

CANZONE, kȧn-tsō′nȧ (It., from Lat. *cantio*, song). The name of one of the oldest and most prized forms of the Italian lyric. The word is borrowed from the Provençals, whose *cansôs* or *chansôs*, however, were not restricted to any precise form, but were simply verses intended to be sung. The Italian writers first attempted to regulate the wayward and arbitrary character of the Provençal *cansôs*, Dante, and subsequently Petrarch, being especially successful. The *canzone petrarchesca* or *toscana* was any considerable lyric poem, composed of stanzas exactly corresponding to one another in number of lines, measure, and position of rhymes, and which customarily closed with a short stanza. Petrarch has no canzone of more than ten or fewer than five stanzas, though later canzoni contain twenty, forty, and even eighty. The number of lines in each stanza varies in Dante and Petrarch between nine and twenty. About the end of the Sixteenth Century the Italian writers began to deviate from the strict form of the Petrarchian canzone. Torquato Tasso and Chiabrera are the most notable names in the new movement. The most of the canzoni of the latter—called by their author *canzonette*—are written in short lines and stanzas, the position of the rhymes being also completely arbitrary.

CAONABO, kä′ō-nȧ-bō′ (? -1496). A Carib Indian who was cacique of Maguana, Hispaniola (Haiti), in 1492. He was married to the famous Anacaona, and in 1493 captured the fortress of La Navidad, Haiti, and massacred the Spaniards left there by Columbus. At the head of 10,000 warriors he headed the general league against the whites in 1494, but was overcome by Columbus at the Vega Real (April 25, 1495), and shortly afterwards was captured by Ojeda. In 1496 he was put on a vessel bound for Spain, but died during the voyage.

CAOUTCHOUC, ko͞o′cho͞ok. See RUBBER.

CAPACITY (Fr. *capacité*, Lat. *capacitas*, from *capax*, capacious, from *capere*, to hold), LEGAL. The power and competency to incur an obligation or to enjoy a legal right. Sometimes the test of capacity is natural, and at other times artificial. In the case of citizens of full age, the natural test of rationality or intelligence is usually applied. If one has the ability to understand the nature and effect of the act in which he is engaged, he is legally capable of doing it. It is in this sense that the phrase *testamentary capacity* is commonly employed. With respect to the enjoyment of rights, however, the test is more often the artificial one of age, coverture, or marriage, alienage, and the like. Whether a particular person of full age and sound mind may hold an office or exercise its elective franchise, or acquire particular kinds of property, depends upon artificial rules established by law. See AGE; ALIEN; INFANT; MARRIED WOMEN; OFFICER; VOTER.

CAPACITY, ELECTRIC. See ELECTRICITY, where, under *Electrostatics*, the subject of Capacity will be found discussed.

CAP À L'AIGLE, kȧp ȧ lȧ′gl'. See MURRAY BAY.

CAPA′NEUS. One of the seven heroes of the expedition against Thebes. He defied Jupiter and was struck by lightning while in the act of scaling the walls.

CAP-À-PIE, kăp′-ȧ-pē′ (Fr., head to foot). In the military language of the Middle Ages, a term applied to a knight or soldier armed at all points, or from head to foot, with armor for defense and weapons for attack.

CAPA Y ESPADA, kä′pȧ ē ĕs-pä′ᴅȧ (Sp., cloak and sword), COMEDIAS DE. A name given to the intrigue plays of Calderon and Lope de Vega, which deal with contemporary aristocratic life in Spain, and introduce the 'cloak' and 'sword' as stock articles of the dress of their principal characters.

CAP DE LA HAGUE, de lȧ hȧg (Fr., Cape of The Hague). A promontory of France, forming the northwestern extremity of the Peninsula of Cotentin, in the Department of Manche (Map: France, E 2). It juts into the English Channel, opposite the island of Alderney, about 16 miles northwest of Cherbourg. It protects, on the east, the roadstead of La Hogue, or Hougue, whence arises the frequent misnomer of Cape La

Hogue. The roadstead gave its name to a great sea fight in which the English and Dutch fleets defeated the French in 1692.

CAPE AGULHAS, à-gōō′lyȧs. See Agulhas, Cape.

CAPE ANN. A cape on the northeast coast and marking the northern limit of Massachusetts Bay, Mass., 31 miles from Boston (Map: Massachusetts, F 2). The cape is marked by two fixed white lights on Thatcher Island, about 900 feet apart, in latitude 42° 38′ N., and longitude 70° 34′ W., 161¾ and 165½ feet above mean high water, and visible for 19 nautical miles; there is also a ten-inch steam fog-whistle. There are valuable stone-quarries at the cape. The whole rocky peninsula, generally included under this name, projects about 10 miles into the Atlantic Ocean. The south and east shores have many attractive summer resorts.

CAPE AR′AGO, or Gregory. A cape on the west coast of Coos County, Ore., on the south side of the outer entrance to Coos Bay (Map: Oregon, A 3). A lighthouse with light 84 feet above sea-level is in latitude 43° 20′ N. and longitude 124° 22′ W., on a small island 2½ miles north and ½ mile east of the western extremity of the cape. The light is fixed white, with white flash every two minutes.

CAPE BAB-EL-MANDEB, bäb′ĕl-män′dĕb. See Bab-el-Mandeb.

CAPE BAR′ROW, or Point Barrow (named after Sir John Barrow). The northernmost point of Alaska on the Arctic Coast; latitude 71° 23′ N., longitude 156° 22′ W. (Map: Alaska, D 1). It is a whaling station. In 1881-83 the United States Signal Service stationed at Point Barrow a party of scientists, to take part in the series of international circumpolar observations instituted during 1882-83.

CAPE BLANCO, bläṉ′kô (Sp., white). A name applied to several capes on the northern and western coasts of Africa. The most remarkable of them is the one on the western coast of Sahara in latitude 20° 45′ N. and longitude 17° W., near the boundary between the Spanish and French possessions on the western coast of Africa, which shelters the Galgo or Levrier Bay. Its name is derived from the white color of the sand. A second Cape Blanco is the northernmost point of Africa, in latitude 37° 20′ N. and longitude 9° 50′ E. A third Cape Blanco is on the west coast of Morocco, in latitude 33° 10′ N. and longitude 8° 30′ W. The same name is also applied to a number of headlands in other parts of the world.

CAPE BLANCO. The westernmost point of Oregon on the Pacific Coast, in latitude 42° 50′ N. and longitude 124° 27′ W., at the mouth of the Sixes River, and 30 miles north of the mouth of the Rogue River (Map: Oregon, A 7). There is a lighthouse with fixed white lights, 256 feet above sea-level, on the extreme western point of the cape.

CAPE BOEO, bô-ä′ô, or Lilibeo (possibly clipped from *Lilybæum*). The westernmost point of Sicily, a mile from Marsala, which occupies the site of the ancient Lilybæum (Map: Italy, G 10).

CAPE BRET′ON. A cape at the eastern extremity of Cape Breton Island, in about latitude 45° 50′ N. and longitude 59° 46′ W. (Map: Nova Scotia, J 4). It is at the entrance to Louisbourg Harbor, and has a lighthouse. It is the terminus of the submarine telegraph cable to Saint Pierre.

CAPE BRETON ISLAND. A rocky island of irregular form in British North America, 100 miles long by 85 miles broad, between latitudes 45° and 47° N., and between longitudes 60° and 61° 30′ W. (Map: Nova Scotia, H 3). It derives its name from a cape at its eastern extremity. It is separated from the peninsula of Nova Scotia by Chebucto or Chedabucto Bay and the Gut of Canso, and is practically divided in two by the land-locked Bras d'Or Lakes and the canal of Saint Peter's Isthmus. It contains 3120 square miles. Its picturesque scenery and bracing summer climate attract an annually increasing number of tourists. The principal exports are pine, oak, birch, maple, fish, iron, and coal. Though the island produces maize and other grains, it depends for its bread-stuffs chiefly on the United States. It is divided into the four districts of Cape Breton, Inverness, Victoria, and Richmond. The towns are Sydney, Arichat, and Port Hood, the once famous Louisbourg, stripped of its fortifications, having become a mere village. Cape Breton, originally a French possession, was taken by the English in 1745; but being subsequently restored to France, it was again captured in 1758 and ceded to England in 1763. After having been for a time a distinct colony, it now forms part of the Province of Nova Scotia. Population, in 1891, 86,850; in 1901, 97,200. With the exception of some 600 Micmac Indians and 15,000 French Acadians, the inhabitants are of Scotch Highland descent. See: R. Brown, *History of the Island of Cape Breton* (London, 1869), and *Coal Fields of Cape Breton* (London, 1871); Sir J. G. Bourinot, *Historical and Descriptive Account of the Island of Cape Breton* (Montreal, 1892).

CAPE CANAV′ERAL. A cape near the middle of the Atlantic coast of Florida, in latitude 28° 28′ N. and longitude 80° 33′ W., and about 20 miles southeast of Titusville (Map: Florida, H 3). The United States Government maintains on the cape a coast signal station and a lighthouse with light 137 feet above sea-level.

CAPE CATOCHE, kä-tō′chä. The northeastern extremity of the Mexican State of Yucatan, situated in latitude 21° 35′ N. and longitude 87° 8′ W. (Map: Mexico, P 7). It was here that in 1517 the Spaniards first saw the Mexican coast.

CAPE CHARLES. The point of land at the northeast side of the entrance of Chesapeake Bay, Va., near latitude 37° 3′ N. and longitude 76° W. (Map: Virginia, H 4). On Smith's Island is a first-order flashing white light, signaling '45' every minute, 157 feet above mean high water. This cape is the extreme southern projection of the 'Eastern Shore' (q.v.).

CAPE CLEAR. A headland of Clear Island, County Cork, the southernmost point of Ireland (Map: Ireland, B 5). It rises 400 feet above the sea, has a lighthouse with a bright revolving light 455 feet above the water-level, and is usually the first land seen from American steamers approaching England. The Fastnett Rock, with a light 148 feet above high water, is 3½ miles to the southwest.

CAPE COAST CASTLE. A strongly fortified seaport and formerly the capital of the

British colony of the Gold Coast, situated southwest of Akkra, the capital of the colony (Map: Africa, D 4). There is an old castle supposed to have been built by the Portuguese in 1664, and the British Government maintains there a military force of about 300 blacks and a number of guns. The port is of some commercial importance, and there is a considerable trade with the interior in palm-oil, ivory, and gold. The population is about 12,000, chiefly Fantis, with a few Europeans.

CAPE COD. The sickle-shaped peninsula forming the southeastern extremity of Massachusetts, and embracing Barnstable County. It extends from Great Herring Pond to Race Point, in latitude 42° 3′ 40″ N., longitude 70° 4′ 18″ W. (Map: Massachusetts, G 3). It is about 65 miles long from the head of Buzzard's Bay, and beyond Barnstable in few places exceeds 8 miles in width. It more than half encircles Cape Cod Bay, and is broken by many harbors, that of Provincetown being one of the best on the New England coast. On the seaward side or highlands, in latitude 42° 2′ and longitude 70° 4′, is a revolving light 183 feet above mean high water, and at Race Point, in latitude 42° 4′ and longitude 70° 15′, is a fixed white light varied by a white flash every 90 seconds, 41 feet above high water. Cape Cod was probably visited a number of times by Europeans during the Sixteenth Century, and on earlier maps was given a variety of names; but it is usually said to have been discovered by Gosnold (q.v.) in 1602, and named from the abundance of the fish in its waters. Charles, Prince of Wales, attempted to change the name to Cape James, in honor of his brother. The cape is sandy, and in part consists of rolling grass-land; but there are fertile portions, and toward the north it is well wooded. Small ponds abound, and salt marshes border the southern shores. The Old Colony division of the New York, New Haven and Hartford Railroad extends through the peninsula, and a ship canal to connect Cape Cod and Buzzard's bays has been partly constructed. Consult Thoreau, *Cape Cod* (Boston, 1865).

CAPE COD FOLKS. A novel by Sarah P. Greene (1881), which excited much discussion by the types it depicted.

CAPE COLON'NA (It., column) (ancient *Sunium Promontorium*). A headland of Greece, forming the southernmost point of Attica, in latitude 37° 38′ N., longitude 24° 1′ E. (Map: Greece, F 4). Crowned by the ruins of a temple of Minerva, its summit rising about 270 feet above the water, Cape Colonna is a conspicuous and remarkable object from the sea. It derives its name from the white marble columns of the temple, which are still standing.

CAPE COLONY, or Cape of Good Hope. A British possession in South Africa, between latitudes 25° and 34° 50′ S., and longitudes 16° 25′ and 30° E. (Map: Africa, G 8). It is bounded by German Southwest Africa, Bechuanaland Protectorate, the Orange River Colony, Basutoland, and Natal on the north, the Indian Ocean on the east and south, and the Atlantic on the west. Its area thus defined and including the British possession of Walfish Bay, on the western coast, is estimated at nearly 277,000 square miles.

Topography. In its physical aspect Cape Colony presents a series of elevated plateaus bounded by mountain ranges running parallel to the southern coast, and increasing in altitude toward the north. The first and most southern mountain chain has an altitude of 3000 to 5000 feet and runs along the southern coast at a distance not exceeding 50 miles. Several small rivers intersect it in a direction from north to south and divide it into several sections called Swellendam, Lange, Ontenigma mountains and a few others. The second mountain chain runs parallel with the first, and has an altitude of 5000 to 7000 feet. It is also divided into several sections, known as the White and the Great Black Mountains, and terminates in the 6000 feet high summit of Cockscomb, northwest of Algoa Bay. The third mountain range has an altitude of 6000 to 8000 feet, and reaches in the summit of Compass, which is the highest of Cape Colony, an altitude of 8500 feet. It is also divided into several parts, the principal of which are the Roggeveld, Nieuwveld, Sneeuwbergen, and Stormberg. The plateau inclosed by the second and the third mountain ranges is known by the name of Great Karroo, and has an average width of about 60 miles. The western coast of Cape Colony is also traversed by a mountain chain, the Karree Bergen, an offshoot of the western section of the first mountain range. The eastern coast of the colony is almost without a single indentation, in contrast to the southern and western coasts, which form a considerable number of bays and capes. The most important are Algoa Bay, Mossel Bay, Cape Saint Francis, Cape Agulhas, the most southern point of Africa, False Bay, Cape of Good Hope, Table Bay, and Saldanha Bay. The chief river of Cape Colony is the Orange River, which forms a great part of the northern boundary. The coast lands are intersected by numerous small rivers and streams, most of them very short and unnavigable, with the exception of the Breede and the Saint John. The inland rivers are very few in number and fall into the Orange River, the Sneeuwbergen marking the division between the Atlantic and the Indian Ocean. Certain indications, such as the numerous saurians and reptiles as well as the dry basins which occur in the Karroos, seem to point to the fact that this part of the colony was in former times more abundantly watered.

Climate. The climate of Cape Colony is, on the whole, dry and very healthful. Rains are more abundant in the east than in the west. The winters are cold in the elevated regions and some of the higher mountain-tops are covered with snow for a considerable part of the year, but the air is dry and bracing. The annual average at Cape Town is over 62° F.

Flora. The flora of the colony varies considerably in accordance with the soil and the climate of the locality. The Karroos are generally covered with many varieties of acacia, euphorbia, and aloe, and are especially rich in bulbous plants. Forests are generally found on the coastlands and furnish many useful varieties of wood, such as the yellow and the black ironwood and several species of palms. Among the cereals, the most important is wheat, which is famous for its excellent quality. All the common European fruits grow in abundance, and the production of wine is a very important industry in the colony.

Fauna. The fauna of Cape Colony has undergone considerable changes since the settlement of the colony by Europeans, and many species which were formerly common and abundantly represented in that country have either entirely disappeared or are of rare occurrence. Among these may be mentioned the rhinoceros and the giraffe, while the lion and the elephant are found only in the eastern parts of the colony. The hippopotamus is still met with in the Orange and in some other rivers. The various species of the antelope family, as well as jackals, hyenas, and monkeys, are still abundant. Among the birds, the most important is the ostrich, which is quite domesticated and furnishes large quantities of feathers, forming one of the staples of the colony.

Geology. In their geological formation, the mountain ranges of Cape Colony are almost of a uniform character, the base being composed in most cases of granite and covered with quartzose sandstone, in some cases to a thickness of 1500 to 2000 feet. Some of the ranges, such as the Stormberg, still show some signs of comparatively recent volcanic action. The surface of the Karroo is generally composed of sand and clay, with a stratum of blue slaty rock underneath, which keeps it from drying up entirely during the rainless season.

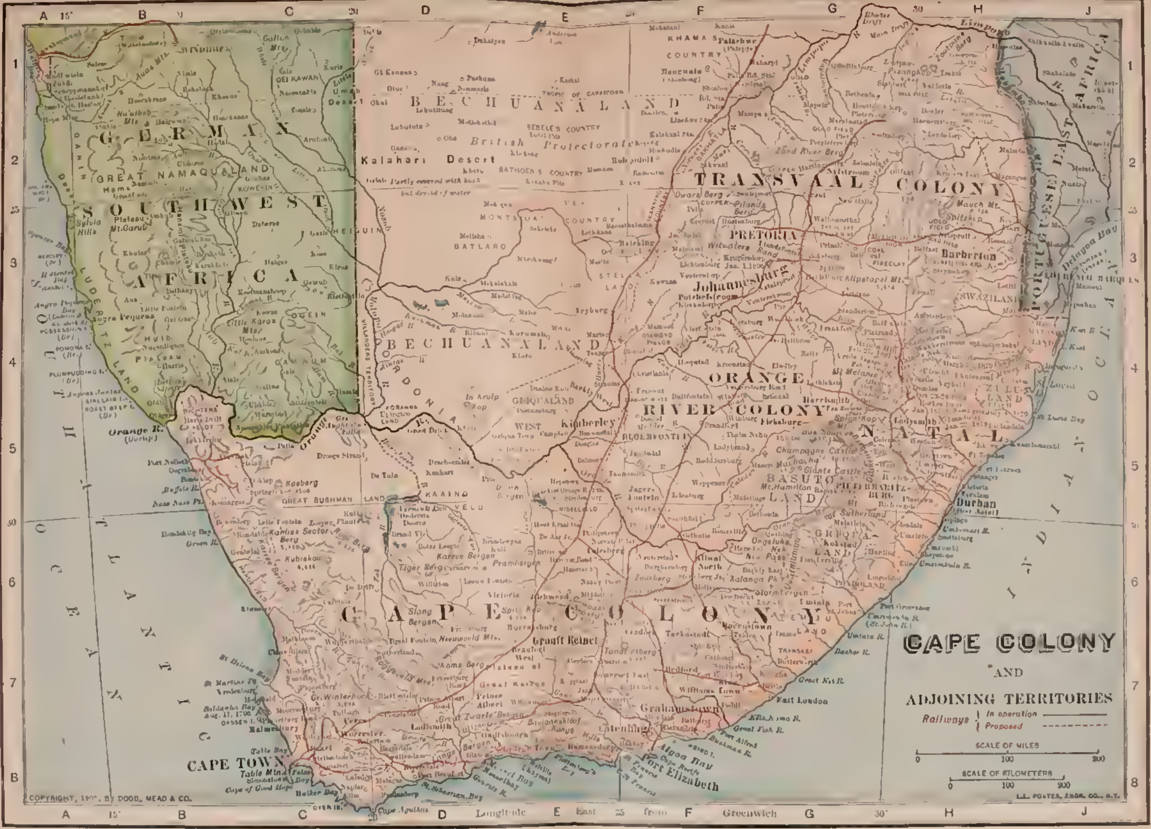
Mineral Resources. The mining industry is of the utmost importance, and Cape Colony is the greatest diamond-producing country in the world. The diamond-fields are almost exclusively situated in Griqualand West, and the mining of diamonds has reached a very high degree of development of late, the annual export amounting to over $20,000,000. It is estimated that from 1867 to 1900 diamonds of the value of over $465,000,000 were exported. The first discovery of diamonds was made in the Hopetown district in 1867, and by 1870 there were about 10,000 men digging for diamonds along the Vaal River. In the same year the 'dry diggings' were discovered between the Vaal and the Modder rivers, which was soon followed by still richer discoveries in the same vicinity and by the foundation of Kimberley, which has since become one of the most important towns in the colony. The mining of diamonds, which was at first largely carried on by individual diggers, has since been concentrated in the hands of a powerful company which controls the entire output of the Kimberley diamond-fields, and, consequently, by far the largest part of the world's output of diamonds. The copper-mines are mostly located in Namaqualand, and the ore found is of a very rich kind, yielding a percentage of from 32 to 36, but the output is comparatively small. The same may be said of coal, which occurs almost everywhere, but is principally mined in the Stormberg mountain range and is used by the State railways. Gold, iron, lead, and salt have been found in small quantities in the Knysna district, at the southern end of the colony. Outside of mining, the industries of the colony are as yet of very little importance and are chiefly confined to the production of beer, tobacco, leather, and flour.

Agriculture. Both by the quality of its soil and its climatic conditions, Cape Colony is better adapted for grazing than for the raising of grain. Wheat, oats, barley, corn, and other grains are raised in quantities hardly sufficient to meet the domestic demand. The rearing of cattle, sheep, and goats is carried on very extensively, many of the sheep-farms ranging in size from 3000 to 15,000 acres. In 1899 the live stock of the colony comprised nearly 1,100,000 head of cattle, about 390,000 horses, over 90,000 mules and asses, over 1,260,000 sheep, nearly 5,600,000 Angora and other goats, and over 260,000 ostriches.

Transportation and Communication. Owing to the deficiency of navigable waterways, the transportation problem very early attracted the attention of the colonial administration, with the result that in regard to transportation facilities Cape Colony may compare favorably with many of the British colonies and some parts of Europe. The roads have a total length of over 8000 miles, and the railway lines (December 31, 1900) of nearly 3000 miles. The first railway line was constructed in 1859, 58 miles long, connecting Cape Town with Wellington. The main object was to connect the most important ports with the interior, and lines were started from East London, Port Elizabeth, and Cape Town in a northern direction. The opening of the diamond-fields of the colony and the gold-fields of the Transvaal gave a new impetus to railway-building. Cape Town has been connected with Kimberley since 1885 and with Johannesburg since 1892. In 1894 the Cape Town line was extended to Mafeking, and since then through Bechuanaland and Matabeleland as far as Salisbury in Rhodesia. Of the total mileage in operation at the end of 1900 the Government operated nearly 2100 miles of its own lines and about 600 miles owned by private companies. The total cost of the State lines up to the end of 1900 was nearly $106,400,000. The telegraph lines, owned by the Government, had a total length of about 7500 miles.

Commerce. The commerce is very extensive in proportion to the population of the country, and shows a considerable development during the last decade. The imports (including specie) rose from about $46,000,000 in 1890 to over $93,500,000, while the exports show an increase from about $81,000,000 to over $115,000,000. While the imports were not affected at all during the first year of the South African War (1899), the exports were diminished by over 70 per cent. The principal imports are textiles, leather, food-stuffs, explosives, hardware, and machinery. The exports consist chiefly of gold, diamonds, wool, ostrich feathers, hair, and hides. Over one-half of the imports come from Great Britain, and nearly the entire amount of exports goes there. The trade with the United States has increased considerably of late. According to official figures products of the United States were imported into Cape Colony in 1899 to the value of over $10,000,000, mostly food-stuffs, agricultural implements, and machinery. The exports from Cape Colony to the United States are insignificant. The inward shipping of the colony for 1900 amounted to nearly 5,000,000 tons, mostly in British vessels.

Government. During the first thirty years of the British occupation (1806-35) the colony was administered entirely from London. In 1835 a legislative council was established consisting of six officials and six nominees of the Crown. The introduction of Parliamentary institutions was accomplished in 1854, and it is only since 1872 that the colony has enjoyed a responsible government similar in all essentials to that of the mother country. At the head of the administration is the Governor, who is also High Commissioner for the British possessions in South Africa. He is appointed by the Crown and assisted by a responsible Cabinet. The Parliament



CAPE COLONY AND ADJOINING TERRITORIES

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consists of two houses, the Legislative Council and the House of Assembly, which meet at Cape Town, the capital. The former numbers 23 members elected for seven years, and is presided over ex officio by the Chief Justice. The House of Assembly consists of 95 members, elected for five years. The qualifications for voters are quite liberal, and no distinction is made on account of color or race. Parliament must meet at least once a year, and the records are kept in English, while in discussions and debates both English and Dutch are allowed. The law of the colony is the Roman-Dutch law modified in accordance with the local requirements and supplemented by special legislative acts. In cases where there is no provision in the Roman-Dutch code, the English law is followed. The highest local judicial authority is the Supreme Court at Cape Town, consisting of the Chief Justice and eight puisne judges. There is also a court of appeal and a vice-admiralty court, both situated at Cape Town. In the separate divisions and towns justice is administered by resident magistrates, while in the outlying villages the same function is performed by periodical courts and justices of the peace. The central government is represented in each division and district by a civil commissioner or magistrate, whose functions include the collection of revenues and administration of justice. There are also divisional councils elected by local rate-payers, and most of the municipalities have municipal councils. The colony has a military force of over 1000 officers and men, known as Cape Mounted Riflemen, besides nearly 7000 volunteers. According to the law passed in 1878, every able-bodied man between 18 and 50 is subject to military service in the colony as well as beyond its limits. There are a number of naval fortifications along the coasts, and a strong British fleet is maintained at Simon's Bay. The principal ports and towns are Cape Town, Port Elizabeth, East London, Graham's Town, Kimberley, Paarl, and Beaconsfield.

FINANCE. The revenue is obtained chiefly from customs duties, licenses, and public domains, and averages about $34,000,000 per annum. The expenditures had reached by the end of the Nineteenth Century the sum of nearly $40,000,000. The indebtedness of the colony is very great when compared with the population, amounting, in 1900, to nearly $153,000,000. The larger part of the debt, however, represents expenditures on public works, the railways alone having absorbed over $106,000,000.

EDUCATION in the colony is assisted by the Government, and is not compulsory. Even among the Europeans illiteracy prevails to a considerable extent. The Department of Public Instruction is under the direction of the superintendent-general, who has charge of the distribution of grants, while the inspection of the schools is conducted by deputy inspectors. In 1901 the enrollment in the schools assisted by the Government was over 146,000. At the head of the educational institutions is the University of the Cape of Good Hope, which is an examining university merely. There are a number of colleges.

POPULATION. The population of the colony, including that of Pondoland and the Crown colony of Bechuanaland, was, in 1891, about 1,600,000, or less than six inhabitants per square mile. The whites constitute less than 25 per cent. of the total population, and the rest is made up of Malays, Hottentots, Kaffirs, Bechuanas, and mixed races. The European population is mostly of English extraction. The descendants of the Dutch settlers, in whose veins there is an infusion of Huguenot blood, are known as Afrikanders. About 750,000 people belong to different Protestant denominations, over 17,000 are Roman Catholics, over 15,000 Mohammedans, and 3000 Jews.

HISTORY. It was toward the end of the Fifteenth Century that Dias, a Portuguese navigator, doubled the Cape of Good Hope, preparing the way for Vasco da Gama, who opened the sea route to India in 1497-98. The thriving trade in that quarter attracted both English and Dutch merchants, but, although their ships found frequent shelter in the bays of the coast of Cape Colony, it was not till the middle of the Seventeenth Century that an attempt was made permanently to occupy the country. In 1652 the Dutch East India Company sent out an expedition which landed in Table Bay and took possession of the region, and set about converting it into a habitable land. Slowly the development went on, Dutch colonists and French Huguenots, fleeing from religious persecution, taking up their abodes there. During the Eighteenth Century the stream of immigration grew larger, the Dutch scattering over a considerable area, busying themselves now with subduing the wilderness, now the aborigines. At the end of the century there were at the Cape about 27,000 souls of European descent and a slightly larger number of slaves.

In January, 1806, for the second time during the wars against Napoleon, an English force captured Cape Colony, stipulating that the "burghers and inhabitants should preserve all the rights and privileges hitherto enjoyed by them." Since that date the Cape has been a colony of Great Britain, though not formally recognized as such until the peace of 1815. During the ensuing sixty years the history of Cape Colony was made up of chapters of war with the Kaffirs and other tribes, and of conflict with the Dutch inhabitants, who, from well-founded causes, felt the rule of England to be oppressive. There occurred during these years the famous 'treks' of the Dutch burghers into the wilderness. The fortitude and heroism they displayed in their wanderings bear high testimony to what men will dare in order to realize in a more or less perfect way their religious, social, and political ideals. The story of the Nineteenth Century in Cape Colony was epitomized in the unequal war between Boer and Briton, which ended in 1902. See SOUTH AFRICAN WAR; TRANSVAAL COLONY; and ORANGE RIVER COLONY.

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pressions of South Africa (ib., 1897). Also consult articles on "Cape Colony" in *International Year Book* (New York, 1899-1901).

CAPE COM'ORIN. The southernmost extremity of the peninsula of India. It is in Travancore, latitude 8° 5′ N., and longitude 77° 37′ E. (Map: India, C 7).

CAPE DE GATA, dȧ gä'tȧ, or **CABO DE GATA**, kä'bō dȧ gä'tȧ. A promontory on the southern coast of Spain marking the east side of the mouth of Almeria Bay, in about longitude 2° 15′ W., and about latitude 36° 40′ N. (Map: Spain, D 4). The most notable of its rocks is the ancient Promontorium Charidemi, the Moorish Kheyran, formed chiefly of agates, spars, and crystals. The cape was once a resort for Moorish pirates.

CAPE DIAMOND. The high bluff, situated at the confluence of the Saint Charles with the Saint Lawrence River, on which stands the citadel of Quebec (Map: Quebec, in Quebec City, E 4). Its precipitous sides rise over 300 feet from the river-level. It is just east of the Plains of Abraham.

CAPE DISAPPOINTMENT. The southwest point of the State of Washington, on the north side of the mouth of the Columbia River, in latitude 46° 16′ N., longitude 124° 3′ W. It has a lighthouse with a light flashing alternately red and white (interval between flashes 15 seconds), at a height of 233 feet above sea-level (Map: Washington, A 3).

CAPE DUKATO, dōō-kä'tō (probably a corruption of Gk. *Λευκάτης*, *Leukatēs*, by an interchange of *l* and *d*) (anciently Lucates). A headland at the southern extremity of Santa Maura, one of the Ionian Islands, in latitude 38° 34′ N. and longitude 20° 32′ E. (Map: Greece, B 3). The strong currents around the cape and frequent fierce gales make it very dangerous for navigation, and the place has long been dreaded by mariners. A cliff about 2000 feet high, on the western side of this Leucadian Promontory, is called Sappho's or Lover's Leap, as it was supposed that here the poetess precipitated herself into the sea. It was an ancient custom to cast a victim annually from this cliff into the sea below.

CAPE ELIZABETH. A headland in Cumberland County, Maine, 6 miles southeast of Portland, and in latitude 43° 33′ N., longitude 70° 12′ W. (Map: Maine, C 8). The United States Government has established two lights on this cape.

CAPE FAREWELL. The southernmost extremity of Greenland, and southern promontory of Egger Island, situated in latitude 59° 49′ N. and longitude 43° 56′ W. (Map: North America, under AMERICA, O 4). It is seldom visited, on account of the ice and dangerous currents, it being here that the East Greenland current rounds Greenland to enter Davis Strait.

CAPE FEAR. A promontory extending into the Atlantic from Smith Island, N. C., near the mouth of Cape Fear River, in latitude 33° 35′ N. and longitude 77° 57′ W. (Map: North Carolina, E 4). Navigation off this cape has long been dreaded by sailors, on account of the treacherous character of the surrounding waters.

CAPE FEAR RIVER. A river in North Carolina, rising in the central northern part of the State, flowing southeast, and emptying into the Atlantic (Map: North Carolina, D 3). The largest tributaries are: from the west, Deep River; from the east, South River, and from the northeast, Northeast Cape Fear River. It is over 300 miles in length, and is the longest river wholly within the State. It is navigable to Fayetteville, 150 miles from its mouth. Wilmington, the most important port of entry in the State, is situated on its bank, 30 miles above the sea. Much has been done to improve navigation up to that city. Along the lower region of the river rice-growing is an important industry.

CAPEFIGUE, kȧp'fēg', BAPTISTE HONORÉ RAYMOND (1801-72). A French historical writer. He was born in Marseilles, and studied law in Paris. He then became a journalist, and contributed to a large number of publications, signing himself 'Un homme d'état.' He held a post in the Foreign Office until 1848, and in this way was enabled to use many documents access to which was closed to others. Besides his journalistic work, he produced no less than a hundred volumes of history, for the most part hastily written and uncritical, and written from an ultramontane point of view. The best of his works is the *Histoire de Philippe-Auguste* (10 vols., 1831-33).

CAPE FINISTERRE, fē'nē'stâr' (Fr., from Lat. *finis*, end + *terra*, earth), or LAND'S END (ancient *Promontorium Nerium*). A high promontory at the northwestern extremity of Spain, in latitude 42° 53′ N. and longitude about 9° 16′ W. (Map: Spain, A 1). It is noted as the scene of two naval victories of the English over the French, on May 3, 1747, and July 22, 1805.

CAPE FLATTERY. The extreme western point of the United States (not including Alaska), in the State of Washington, at the southern side of the entrance to the Strait of Juan de Fuca (Map: Washington, A 1). On Tatoosh Island, in latitude 48° 23½′ N. and longitude 124° 44′ W., and one-half mile northwest of Cape Flattery, there is, at a height of 155 feet above sea-level, a fixed white light, with a fixed red sector between southeast one-half south and south-southeast seven-eighths east.

CAPE FLORIDA. The southernmost extremity of Key Biscayne, in Dade County, Fla., about 10 miles southeast of Miami, in latitude 25° 38′ N., longitude 80° 8′ W. (Map: Florida, D 4). There is a fixed red beacon light, 31 feet above the sea-level, on Cape Florida Shoal.

CAPE FOULWEATHER. A cape on the west coast of Lincoln County, Ore., in about latitude 44° 50′ N. and about longitude 124° 5′ W. (Map: Oregon, A 5).

CAPE GIRARDEAU, jē'rär-dō'. A city in the county of the same name, Missouri, 50 miles above Cairo, Ill., on the Mississippi River, and on the Saint Louis, Memphis and Southeastern, the Saint Louis and Gulf, and other railroads (Map: Missouri, G 4). It is in a well-cultivated section, and has a large commerce, by river and railroad, in lumber, flour, lime, limestone, and mineral paints. The notable institutions include Saint Vincent's College (Roman Catholic), the Southeast Missouri State Normal School, Saint Francis's Hospital, and the Convent of the Sisters of Loretto. The county court-house and city hall are pretentious buildings. The government is administered by a mayor, elected biennially, and a city council. Population, in 1890, 4297; in 1900, 4815.

CAPE GREGORY. See CAPE ARAGO.

CAPE HAITIEN, ȧ'ē'tyăɴ'. The second city of Haiti in importance and size (Map: West Indies, L 5). It is situated on the northern coast, overlooking a spacious harbor and surrounded by picturesque mountains. The town is well laid out, and has the appearance of the older European towns. In 1842 it was nearly destroyed by a disastrous earthquake, in which several thousand people perished, and from which the town has not recovered since. During the French occupation, Cape Haitien was the capital of the island. The commerce is very important, and the chief exports are coffee and logwood. The population is estimated at 29,000. A United States consul resides here.

CAPE HATTERAS. A cape in latitude 35° 15′ N. and longitude 75° 31′ W., projecting into the Atlantic from Hatteras Island, a long, narrow, sandy island bordering Pamlico Sound (Map: North Carolina, G 2). It is a dangerous part of the American coast for navigators, on account of shoals and frequent gales and storms. Coasting vessels are apt to pass in toward this cape, on account of the Gulf Stream, which is only about 20 miles east. The cape has a light, flashing every ten seconds, 191 feet above mean high water; also, about three-quarters of a mile south, a fixed white beacon light, 35 feet above the sea.

CAPE HENLO′PEN. A point of land on the east coast of Delaware, in latitude 38° 47′ N. and longitude 75° 5′ W., at the south side of the entrance to Delaware Bay (Map: Delaware, Q 5). It is about 13 miles a little west of south of Cape May, on the opposite New Jersey shore. The Cape Henlopen light, 126 feet above sea-level, is a fixed white light, with a fixed red sector between southeast one-eighth east and south one-eighth east.

CAPE HENRY. A point of land on the coast of Virginia, in latitude 36° 56′ N. and longitude 76° 1′ W., at the south entrance to Chesapeake Bay, opposite Cape Charles (Map: Virginia, J 5). Cape Henry has a life-saving station and a lighthouse. The light is 157 feet above sea-level, shows fixed white, with a fixed red sector between south-southeast and southwest by west.

CAPE HORN (from *Hoorn*, a city of Holland), or HOORN. The most southerly point of America, terminating an island of its own name, in the Archipelago of Tierra del Fuego (Map: Chile, D 15). It is situated in latitude 55° 59′ S. and longitude 67° 16′ W. It has a perennially Antarctic climate, and is merely a detached link, bare and rugged, of the chain of the Andes. It was discovered by Schouten, a native of Hoorn, in Holland, in 1616, about 90 years later than the Strait of Magellan, and since then the course of navigation of sailing vessels has been round the cape, instead of through the strait.

CAPE HUNTING-DOG. See HUNTING-DOG.

CAP′EL, ARTHUR, Lord (c.1610-49). An English Royalist leader during the Revolution. He represented Hertford in both the Short Parliament and the Long Parliament, and was inclined to side with the popular party under the leadership of Pym, in so far as that party demanded merely a redress of grievances; but, strongly opposing a democratic revolution, he joined the Court party, and in August, 1641, was made Lord Capel of Hadham. He became an officer in the Royalist Army, and in 1643 served as lieutenant-general of Shropshire, Cheshire, and North Wales. He then acted for a time as a member of the advisory council of the Prince of Wales, and on the success of the popular party retired to his estate at Hadham; but in 1648 he strongly advocated the renewal of civil war, and, with Goring and Lucas, attempted in vain to hold Colchester against the forces of Lord Fairfax. Soon afterwards he was tried and convicted of treason, and on March 9, 1649, was beheaded.

CAPEL, THOMAS JOHN (1836—). An English Roman Catholic priest, born October 28, 1836. When but seventeen years old he, with others, founded a normal training college for the education of school-teachers, of which, in 1856, he was made vice-principal. Being compelled to seek southern Europe on account of ill health, he founded at Pau a mission for English-speaking Roman Catholics, in consequence of which the Pope advanced him to 'monsignore.' Returning to England, in 1873 he established the Roman Catholic Public School at Kensington, and devoted much of his time to preaching, becoming widely noted for his eloquence, and was particularly successful in making converts to Romanism among the gentry of the Church of England; but since 1884 he has not been heard from. He is said to be the original of Catesby in Disraeli's *Lothair*. In 1874 he published a *Reply to Gladstone's Political Expostulation*, and in 1884 *"Catholic," an Essential and Exclusive Attribute of the True Church*. He lived in California many years.

CAP′ELL, EDWARD (1713-81). A critical editor of Shakespeare, born at Throston, near Bury Saint Edmunds. He was educated at Catharine's Hall, Cambridge, appointed deputy inspector of plays in 1737, and devoted his life to the study of Shakespeare, whose plays he transcribed ten times. In 1760 he published *Prolusions, or Select Pieces of Ancient Poetry*, including a reprint of *Edward III.*, as possibly Shakespeare's. His edition of Shakespeare (10 vols., 1768) was followed by commentaries in three volumes, which were not all published till 1783, two years after Capell's death. They bore the title, *Notes and Various Readings of Shakespeare*. Capell collated the quartos and the first two folios more carefully than any previous editor.

CAPEL′LA (Lat., kid). A bright star of the first magnitude, on the left shoulder of Auriga. Capella is also called Capra, or the *She-Goat*, a name also sometimes given to Capricorn. The poets fable Capella to be Amalthea's goat, which suckled Jupiter in his infancy.

CAPELLA, MARTIANUS MINEUS FELIX. A learned author belonging to the second half of the Fifth Century. He was born in Africa, perhaps at Madaura, as Cassiodorus says. Of his life nothing whatever is known. The work which has preserved his name to posterity is the *Satiri-*

con, a kind of encyclopædia, highly esteemed during the Middle Ages as a work of reference. It is written in a medley of prose and verse, and is full of curious learning, but possesses no literary value. The style has all the bombastic pomp of the African school of later Latinists. It consists of nine books. The first two consist of an allegory, *The Nuptials of Philology and Mercury*, while the remaining seven are devoted to the 'liberal arts'—grammar, dialectics, rhetoric, geometry, arithmetic, astronomy, and music.

The book on astronomy is remarkable as containing a hint of the true theory of the solar system. Mercury and Venus are there declared to move around the *sun*, and not around the *earth*, and their relation to these bodies is properly explained. The best edition is that of Eyssenhardt, Leipzig (Teubner), 1866.

CAPELLINI, kä'pĕl-lē'nē, GIOVANNI (1833—). An Italian geologist, born in Spezia. He studied at the University of Pisa, and in 1860 was appointed professor in Genoa. Subsequently he was called to be professor of geology and paleontology in Bologna. He was one of the first Italian scientists to accept the Darwinian theory. He founded in Bologna a geological museum, and originated the international congress for anthropology and prehistoric archæology. His publications include: *Delfini fossili del Bolognese* (1864); *Relazione d'un viaggio scientifico nell' America settentrionale* (1867); and *Armi e utensili di pietra del Bolognese* (1870).

CAPELLO, kȧ-pĕl'lō, or **CAPPELLO** (It., hair), BIANCA (c.1542-87). An Italian adventuress, wife of Francesco de' Medici. She was born of a noble family in Venice, and in 1563 eloped to Florence with Pitro Bonaventuri. Soon afterwards she formed a liaison with Francesco de' Medici, who had recently married Joanna, Archduchess of Austria. The lack of a male heir was a source of great sorrow to Francis, and in 1576 Bianca presented to him a supposititious son, whom the Duke received as his own and named Antonio. To prevent the detection of the imposture, she caused the assassination of those who had assisted her in its perpetration. Bonaventuri had been put to death by order of Francesco in 1570, and Joanna died in 1578. Three months later, notwithstanding the opposition of his relatives and counselors, Bianca persuaded the Grand Duke to make her his wife. The marriage was approved by Philip II. of Spain, and in October, 1579, Bianca was proclaimed Grand Duchess of Tuscany. She immediately endeavored to secure her position by obtaining the good-will of the Medici family, and particularly of the Cardinal Ferdinand, brother and next heir to Francesco. In 1587, however, the two brothers and Bianca met at Poggio á Cajano, and a few days later the Grand Duke and his wife were suddenly taken ill and both died. Ferdinand has been accused, but probably unjustly, of having poisoned them. Though through life she retained undiminished power over the affections of her capricious prince, Bianca did not succeed in making Antonio his successor. She failed, too, to conciliate her subjects, and many stories of her cruelty and propensity for magical arts are part of the popular tradition of Florence to-day. Consult: Siebenke, *Bianca Capello* (Gotha, 1789); Saltini, *Della morte di Francesco de' Medici e di Bianca Capello* (Florence, 1863); and two articles on Bianca Capello in the *Revue des Deux Mondes* (Paris, 1884).

CAPELLO, HERMENEGILDO AUGUSTO DE BRITO (1839—). A Portuguese African traveler, born in Lisbon. He became a captain in the royal navy in 1880. In 1877 he was sent by the Government with Major Serpa Pinto and Roberto Ivens to explore the Portuguese colony of Angola. He and Ivens separated from Serpa Pinto and explored the basin of the Kuangu from the headwaters of that river to the Yaka district. With Ivens he was again dispatched by the Government in March, 1884, to traverse the southern part of the continent from Portuguese West Africa (Angola) to Portuguese East Africa. He explored Amboella and the watershed between the Kongo-Lualaba and Zambezi rivers, and directed his course along the Zambezi from Zumbo to Quilimane on the eastern coast, where he arrived in May, 1885. In collaboration with Ivens he wrote *De Benguella as terras de Jacca* (1881), and *De Angola á Contra-Costa* (1886).

CAPE LOOKOUT. A point of land on the east coast of North Carolina, about 70 miles southwest of Cape Hatteras, and 12 miles southeast of Beaufort, in latitude 34° 37′ N. and longitude 76° 31′ W. (Map: North Carolina, F 3). The lighthouse on this point has a fixed white light 156 feet above mean high water.

CAPE MATAPAN, mä'tȧ-pän'. The southernmost extremity of Greece, between the gulfs of Laconia and Messenia, in latitude 36° 23′ N. and longitude 22° 29′ E. (Map: Greece, D 5). The ancient Greeks called it Tænarum, and made it sacred to Neptune, whose temple stood near the cape.

CAPE MAY. The southern point of New Jersey, on the north side of the entrance to Delaware Bay (Map: New Jersey, C 5). A lighthouse with light flashing every thirty seconds, 164½ feet above mean high water, is located here.

CAPE MAY. A frequented watering-place, sometimes called Cape City, or Cape Island City. It is the southernmost city of New Jersey, in Cape May County, on the South Jersey and West Jersey and Seashore railroads (Map: New Jersey, C 5). There is a fine beach several miles long, with excellent bathing facilities; the hotels are numerous and of modern construction, and in summer the place is a favorite resort of Philadelphians, as well as of people from cities more remote. The climate is usually equable and pleasant. The city has fishing, gold-beating, canning, and oyster-raising interests. Its government is administered by a mayor, elected every two years, and a city council. Population, in 1890, 2136; in 1900, 2257.

CAPE MENDOCINO, mĕn'dō-sē'nō. A cape in Humboldt County, Cal., the extreme western point of the State, in latitude 40° 26′ 24″ N. and longitude 124° 23′ 27″ W. (Map: California, A 1). On its highest point, 428 feet above sea-level, is located a lighthouse of the first class.

CA'PEN, ELMER HEWITT (1838—). An American clergyman and educator, born in Stoughton, Mass. He graduated at Tufts College in 1860, and was admitted to the Suffolk bar in 1863. Subsequently he studied theology, was ordained pastor of the Independent Christian Church of Gloucester in 1865, and from 1869 to 1875 held other pastorates at Saint Paul, Minn., and Providence, R. I. In 1875 he was appointed president of Tufts College, whose effectiveness and prosperity he has greatly increased. In addition to his duties as president, he has also given instruction in political economy and ethics.

CAPE NOME. A projection from the western mainland of Alaska, extending into the northwest part of Norton Sound, in about latitude 64½° N. and longitude 165° W. In the sands near the seacoast, and in the valleys of the streams, are found very rich deposits of gold, which are easily accessible (Map: Alaska, B 3). (See NOME.) Consult Dunham, "The Yukon and Nome Gold Regions," in *Department of Labor Bulletin 11* (Washington, 1900).

CAPE OF GOOD HOPE. See CAPE COLONY.

CAPE OF GOOD HOPE. A promontory of southern Africa, rising 1000 feet above the sea, and popularly regarded as the most southerly point of the Continent, though it is half a degree to the north of Cape Agulhas (Map: Africa, F 8). The latter is merely a projection on a coast line, which diverges inconsiderably from a parallel; but the former is really the turning-point from south to east on the voyage from Europe to India. It is situated in latitude 34° 22′ S. and longitude 18° 30′ E., being the termination of Table Mountain (q.v.). The cape was discovered by Dias, a Portuguese navigator (who christened it the Cape of Storms), as early as 1486—six years before Columbus, in aiming at the same goal by a different route, led the way to America. But it was only in 1497 that Vasco da Gama realized the value of Dias's discovery, by rounding it on his adventurous voyage from Lisbon to Calicut. Besides opening a new channel for the traffic of the East, the discovery of the cape was partly instrumental in removing the trading superiority from the republics of Italy to the States of western Europe.

CAPE OF STORMS, THE. The English translation of a Portuguese name, Capo Tormentoso, given by Bartholomeu Dias to the Cape of Good Hope, about which he was the first to pass.

CAPE ORTEGAL, ôr'tâ-gäl'. A northern extremity of Spain, projecting on the northwest coast into the Bay of Biscay, in latitude 43° 47′ N. and longitude 7° 56′ W., on a rugged and barren coast (Map: Spain, A 1).

CAPE PAL'MAS. The southernmost extremity of Liberia, Africa, in latitude 4° 22′ N. and longitude 7° 44′ W., and marking the point at which the Maryland colony of free colored emigrants settled in 1834 (Map: Africa, D 4).

CAPE PIGEON, or CAPE PETREL. The pintado petrel, a large Antarctic petrel (*Daption Capensis*) somewhat resembling a pigeon, common in large numbers about the Cape of Good Hope, and of great interest to voyagers. See PETREL.

CAPE POGE. The extreme northeast point of the Martha's Vineyard Island group, and the northern extremity of the eastern strip of Chappaquiddick Island (Map: Massachusetts, G 5). Cape Poge lighthouse is in latitude 41° 25′ N. and longitude 70° 27′ W. The light flashes white and red, every third flash red, with five seconds' interval between flashes. It is 53¾ feet above sea-level.

CAPE PRINCE OF WALES. The west point of the mainland of Alaska and of the American continent, opposite East Cape in Siberia. Bering Strait between the two is the narrowest water between America and Asia (Map: Alaska, B 2). The cape is slightly south of the Arctic Circle. It terminates in a bold bluff, north of which are dangerous shoals.

CAPER (Fr. *capre*, Lat. *capparis*, Gk. κάππαρις, *kapparis*). The pickled flower-bud of the caper-bush (*Capparis spinosa*). It has an agreeable pungency of taste, with a slight bitterness, and has long been in very general use as a condiment and ingredient of sauces. It possesses medicinal properties, being an antiscorbutic, stimulant, and laxative. It is of a grayish-green color, to improve which copper is sometimes used. The caper-bush is a native of the Mediterranean countries. It is extensively cultivated in some parts of the south of France and in Italy, but most of all in Sicily. It succeeds in the open air even at Paris, but in Great Britain it requires the aid of artificial heat. In the northern United States capers are propagated by cuttings in greenhouses, but they are grown from seed in the South. It is a trailing, rambling shrub, loving dry places and often growing on rocks or walls. It begins to flower early in summer, and continues flowering till winter. The buds are gathered every morning, and are immediately put into vinegar and salt. At the end of the season they are sorted according to their size and color, the greenest and least expanded being the best, and are again put into vinegar, the finest being sent to the market in bottles, the coarser in small barrels. The fruit, which is a small berry, is also pickled in the south of Italy. The flower-buds of the caper of Mount Sinai (*Capparis Sinaica*) are pickled like those of the common species; the seeds are also pickled and are called by a name signifying mountain pepper. The fruit of *Capparis aphylla* is made into a pickle in India. The species of Capparis number about 150, and are found in most tropical and subtropical regions except North America. Various substitutes for caper are sometimes used, as the flower-buds of the marsh-marigold (*Caltha palustris*), those of the Indian cress, or so-called nasturtium (*Tropæolum majus*), and those of the bean-caper (*Zygophyllum fabago*) and of the bladdernut (*Staphylea trifolia*). The caper-tree (*Capparis Jamaicensis*), which grows throughout the West Indies, in South America, and in Florida, is a small tree with a very hard wood. The caper of England is a spurge, belonging to the genus Euphorbia. It has no relationship with the foregoing. For illustration, see Plate of CAMELLIAS.

CAPE RACE. A cape forming the southeast extremity of Newfoundland, in latitude 46° 40′ N. and longitude 52° 55′ W. (Map: Newfoundland, G 6). It has a lighthouse, with light 180 feet above the water. This is an important beacon for the transatlantic vessels passing between Europe and northern North America.

CAPERCAILLIE, kā'pēr-kāl'yĭ, or **CAPERCAILZIE,** kā'pēr-kāl'zĭ *or* -kāl'yĭ (of uncertain etymology, possibly from Gael. *cabhar*, hawk +

coille, wood; according to some, from Gael. *capull-coille*, from *capull*, mare, Lat. *caballus*, horse + *coille*, or from Gael. *cabhar* + *coileach*, wood), Wood-Grouse, or Cock of the Woods. A European grouse (*Tetrao urogallus*), almost equal in size to the turkey. The adult male is brownish-black, minutely freckled with grayish-white, and with lighter brown; quill-feathers, dark brown; tail-feathers, nearly black; chest, a shining dark green; there is a small scarlet patch of naked skin above the eye, and the bill is whitish. The general color of the smaller female and of young males is dark brown, freckled with yellowish-brown; the front of the neck and the chest are yellowish-chestnut, and the feathers of the under parts are generally edged with white; the feet are feathered to the toes. It is an inhabitant of pine woods; feeds on berries, seeds, worms, insects, etc., and on the young shoots of the pine, birch, and other trees. The female makes her nest on the ground, and lays from six to twelve eggs, of a pale reddish or yellowish brown, spotted with other shades of brown, and more than two inches long. Like the black-cock, the capercaillie is polygamous, and is noted for its extraordinary 'dances' in courtship. In spring, on the approach of the breeding season, the cock "mounts to the topmost boughs of a tall tree, whence he challenges all comers by extraordinary sounds and gestures, while the hens . . . timidly abide below the result of the frequent duels, patiently submitting themselves to the victor." During these antics the bird seems oblivious to all else, and may easily be approached. The capercaillie is found on the pine-covered mountains of all parts of Europe, and a related species (*Tetrao urogalloides*) is abundant in the northern parts of Asia. It once lived in Scotland and Ireland, where it was completely extirpated toward the end of the Eighteenth Century, but has been restored to the forests of northern Scotland by stock imported from Scandinavia. The capercaillie is readily domesticated, if allowed the range of a space containing a few pine-trees, and is much esteemed for the table. It is hunted with the aid of dogs, who 'tree' the birds, when they are shot down. Consult: Lloyd, *Game Birds of Sweden and Norway* (London, 1867); Morris, *British Game Birds* (London, 1891); Darwin, *Descent of Man* (London, 2d ed., 1874). See Plate of Grouse, etc.

CA'PERN, Edward (1819-94). An English poet, known as the 'Rural Postman of Bideford.' He was born at Tiverton, Devonshire, and was engaged as a postman at Bideford until, through Landor's influence, he obtained a pension from the English civil list. His productions, which are marked by freshness and melody, include: *Poems by the Bideford Rural Postman* (1856; often republished); *Ballads and Songs* (1858); *Wayside Warbles* (1865, 2d ed. 1870); *Sun Gleams and Shadow Pearls* (1881); and *The Devonshire Methodist*, which includes the author's own music to some of his songs.

CAPERNAUM, kȧ-pẽr'nȧ-ŭm (Gk. *Καπερναούμ*, *Kapernaoum*, Καφαρναούμ, *Kapharnaoum*, Heb. *Kaphar Nahum*, village of Nahum). A town of Galilee frequently mentioned in the gospel history. When Jesus was driven out of Nazareth at the opening of his Galilean ministry he made his home at Capernaum (Matt. iv. 13). So closely did he identify himself with it that it is called 'his own city' (Matt. ix. 1). Though it was the scene of many of his miracles and wonderful discourses, it remained unrepentant. With Chorazin and Bethsaida it had its ruin foretold by Jesus (Matt. xi. 20-24). The place was a city of some importance. It had a synagogue (Luke iv. 31-32), was the seat of a Roman garrison (Luke vii. 1), and a customs station from which Matthew was called to be an Apostle (Matt. ix. 9). There has been much discussion as to the site of Capernaum, as the city is mentioned only in the New Testament. The original form of the name was Kaphar Nahum, i.e. 'Village of Nahum.' Two localities are favored by authorities—Tell Hum and Khan Minyeh, both on the northwest coast of the Sea of Galilee, not far distant from each other. At Tell Hum many extensive ruins have been found, some of which have been supposed to be those of the synagogue in which Jesus taught. The situation of Khan Minyeh, however, corresponds better to the New Testament notices and to the statement of Josephus (*Wars*, iii. 10-8) that a copious spring named Capernaum watered the plain of Gennesaret. Consult, in behalf of the claims of Tell Hum, Buhl, *Die Geographie des alten Palästina* (Freiburg, 1896); for Khan Minyeh, G. A. Smith, *The Historical Geography of the Holy Land* (New York, 1895).

CA'PERS, William (1790-1855). An American clergyman, bishop of the Methodist Episcopal Church, South. He was born in South Carolina, studied in South Carolina College, became an itinerant preacher, and for a time was a missionary among the Indians in Georgia. He was for several years presiding elder in Charleston, where he edited the *Wesleyan Journal* (afterwards merged in the *New York Christian Advocate*). He declined the presidency of three southern colleges and professorships in two others, preferring to devote himself to home missionary work. In 1837 he established and edited the *Southern Christian Advocate*. At the first general conference of the Methodist Episcopal Church, South, in 1846, he was chosen bishop. His autobiography was published, with a memoir by Wightman, in 1858.

CAPE SABLE. The southernmost point of Cape Sable Island, off the southern coast of Nova Scotia, Canada (Map: Nova Scotia, D 6).

CAPE SABLE. The southernmost point of the mainland of Florida, and of the mainland of the United States as well (Map: Florida, C 4). It is in latitude 25° 8′ N. and longitude 81° 7′ W., and projects slightly into the Bay of Florida.

CAPE SAINT GEORGE. A cape on the west end of Saint George Island, off the west coast of Florida, about 10 miles south of Apalachicola (Map: Florida, D 2). The Cape Saint George lighthouse is in latitude 29° 35′ N. and longitude 85° 2′ W., about 3½ miles east of the west pass entrance to Apalachicola Bay. The light is 72 feet above sea-level, and is fixed white.

CAPE SAINT VINCENT. A headland at the southwest extremity of Portugal in about latitude 37° N. and longitude 9° W. (Map: Portugal, A 4). Off this cape the British, under Admiral Jervis, defeated a Spanish fleet February 14, 1797.

CAPE SAN BLAS, sän bläs. A cape on the west coast of Florida, the southern point of the neck of land which separates San Blas Bay from Saint Joseph's Bay (Map: Florida, C 2). It is about 20 miles nearly west of Apalachicola. Cape San Blas lighthouse is at the southernmost point of the cape in latitude 29° 40′ N. and longitude 85° 21′ W. The light is 98 feet above the sea-level and flashes alternately red and white, the interval between flashes being thirty seconds.

CAPE SAN LUCAS, lo͞o'k*a*s. The southernmost point of the peninsula of Lower California, Mexico, situated in about latitude 22° 50′ N. and longitude 109° 54′ W. (Map: Mexico, D 6).

CAPE SAN ROQUE, rō'kȧ. A promontory on the extreme northeastern coast of Brazil, situated in latitude 5° 30′ S. and longitude 35° 14′ W. (Map: Brazil, K 5).

CAPE SPAR'TIVEN'TO (ancient *Herculis Promontorium*). The southeastern promontory of Italy, situated in latitude 37° 57′ N., longitude 16° 5′ E., and once regarded as the most southern point of Italy (Map: Italy, L 10).

CAPETIAN (kȧ-pē'sh*a*n) **DY'NASTY** (Fr. *Capétiens*). The royal line in France from 987 to 1328. On the death of Louis V., the last of the Carolingians, in 987, Hugh Capet was elected King by the aid of the clergy. From that time, for 341 years, all of the rulers of France belonged to the same family, and in almost every instance the son succeeded the father. The kings of the Capetian dynasty strengthened greatly the royal power in France by insisting upon the principles of heredity, primogeniture, and the indivisibility of the Crownlands, which they strove to increase. In the same year that he was crowned, Hugh caused his son Robert to be elected as his associate, and his practice was followed until 1179, when Philip Augustus was crowned as his father's associate. By that time the hereditary principle was so firmly established that it was no longer necessary for the son to be chosen during his father's lifetime. The Capetians broke entirely away from the Merovingian and Carolingian custom of dividing the kingdom among all the sons. The eldest son alone became King and received the royal domain, and in this way the kingdom was saved from the divisions which had weakened the Carolingian Empire. The Capetians also by a forced interpretation of the Salic Law (q.v.) excluded females from the succession. (See HUNDRED YEARS' WAR.) Most of the Capetians endeavored to add to the royal domain by the incorporation of additional fiefs, large or small, and thus gradually obtained the direct lordship over a large part of France. This process was very rapid under Louis VI., Philip Augustus, Louis IX., and Philip IV. The Capetian dynasty was succeeded by the Valois dynasty (q.v.).

The rulers of the line were: Hugh Capet, 987-996; Robert II., 996-1031; Henry I., 1031-60; Philip I., 1060-1108; Louis VI., 1108-1137; Louis VII., 1137-80; Philip II. Augustus, 1180-1223; Louis VIII., 1223-26; Louis IX., 1226-70; Philip III., 1270-85; Philip IV., 1285-1314; Louis X., 1314-16; Philip V., 1316-22; Charles IV., 1322-28.

CAPE TOWN. The capital of Cape Colony and the second seaport of British South Africa (Map: Cape Colony, D 9). It is situated on Table Bay, on a slope of Table Mountain, in latitude 33° 56′ S. and longitude 18° 28′ E. It is well built with fine streets and squares and all the improvements of a modern city, including electric lighting. The public buildings as well as the private residences are in modern European style, and the entire aspect of the place, with the exception of the heterogeneous crowds in the streets, is essentially European. The climate is comparatively moderate and healthful, and the water-supply excellent. There are a cathedral, several churches of different denominations, a synagogue, and several mosques. The houses of Parliament, the buildings of the Supreme Court, and the banks are among the chief secular edifices. Cape Town has several colleges and an examining university, a South African Museum, a library, and an observatory, besides a number of schools for elementary and secondary education. The harbor has been improved by a breakwater of gigantic proportions and is divided into several parts, of which the inner harbor is sufficiently deep for the heaviest vessels. The entrance to the harbor is defended by a castle which is the headquarters of the military forces of the colony. The commerce of Cape Town is exceeded only by that of Port Elizabeth. The capital is connected by railway lines with all the important centres in the interior.

Cape Town is the seat of a Catholic and an Anglican bishop, and of a number of consular representatives, including one from the United States. The population, numbering about 84,000 (including suburbs), is extremely heterogeneous, including negroes, Kaffirs, Hottentots, and Europeans, largely of Dutch descent, who constitute over 50 per cent. of the total population of the town proper. Cape Town was founded in 1652 by the Dutch, in whose possession it remained until 1806, when it was taken possession of by England.

CAPE VERDE. The westernmost point of Africa, jutting out into the Atlantic Ocean, nearly midway between the rivers Gambia and Senegal, in latitude 14° 43′ N., longitude 17° 34′ W. (Map: Africa, C 3). It was discovered by the Portuguese about 1445, and is said to have derived its name from a group of gigantic baobab trees which adorns its summit and forms a green spot on the white coast.

CAPE VERDE ISLANDS (*Ilhas Verdes*). A group of islands in the Atlantic Ocean, west of Africa, belonging to Portugal, situated between latitudes 14° 45′ and 17° 19′ N., and between longitudes 22° 45′ and 25° 25′ W. (Map: Africa, B 3). The ten principal islands are Santiago (São Thiago), the largest and most important, Fogo, Brava, Maio, Boavista, São Nicolao, Santo Antão, São Vicente, Santa Luzia, and Sal. Including the four uninhabited islets, the total area of the group is estimated at 1480 square miles. The islands are all very mountainous, and owe their origin to the action of submarine volcanoes. The only active volcano is situated on the island of Fogo and has an altitude of over 9000 feet. The climate is hot and unhealthful, and the droughts which occasionally visit the islands are frequently followed by famines. Sugar, coffee, tobacco, and indigo are cultivated, and some southern fruits are successfully grown. The plant *Jatropha curcas* is also considerably cultivated. Several of the European domestic animals thrive well. Turtles abound in the surrounding seas, and whales are hunted by

British and American vessels. Amber is found on the coasts, and great quantities of salt formed by solar evaporation are obtained from the lagoons on the shores, especially on the island of Sal. The commerce of the colony amounted, in 1900, to over $3,450,000, of which nearly $3,000,000 represented imports. The exports consist of raw products, hides, salt, coffee, while the imports include all kinds of manufactured articles. The chief ports are Porto Praya, the capital, on the island of Santiago, and Porto Grande, which has the best harbor in the whole group, on the island of San Vicente. The group is administered by a governor. The population was 147,424 in 1900, including only 3856 whites, the remainder consisting of 24,639 colored and 118,929 negroes. The islands were discovered in 1441 by the Genoese seafarers Antonio and Bartolommei di Nolli, and were annexed to Portugal in 1456. Consult: Ellis, *West African Islands* (London, 1885); Fea, *Delle Isole del Capo Verde* (Rome, 1899); Lima, "Rapport sur les îles du Cap Vert," in *Recueil consulaire*, Vol. CX. (Brussels, 1900).

CAPE VINCENT. A village and port of entry in Jefferson County, N. Y., 25 miles west by north of Watertown, on the Saint Lawrence River, and on the Rome, Watertown and Ogdensburg Railroad (Map: New York, D 1). It is popular as a summer resort, and contains a United States fish-hatchery and a Government customs office. The village has considerable trade, the annual value of its exports being about $150,000, and of imports about $250,000. Population, in 1890, 1324; in 1900, 1310.

CAPE WRATH. The northwest extremity of Scotland, in Sutherlandshire, a pyramidal promontory 523 feet high (Map: Scotland, C 1). It is noted for its wildness and grandeur, and projects into the Atlantic in latitude 58° 38′ N. and longitude 4° 58′ 5″ W. Its lighthouse is visible 27 miles.

CAP'GRAVE, JOHN (1393-1464). An English historian and theologian. He was born at Lynn, was ordained a priest about 1418, and was afterwards made provincial of the Augustinian order in England. His works include Latin commentaries on the Bible; a *Life of Saint Katharine*, in English verse; *A Chronicle of England from the Creation to A.D. 1417; A Guide to the Antiquities of Rome;* and *De Illustribus Henricis*. The last work and the chronicle were edited by F. C. Hingestor, and published in the *Rolls Series* (London, 1858).

CAPH'TOR. The original home of the Philistines, Deut. ii. 23, Amos ix. 7, who are therefore called Caphtorim, Gen. x. 14, Deut. ii. 23. Crete is probably meant. Its importance during the Mycenæan Age and its close relations to Egypt, as revealed by recent discoveries, render the identification natural. The Cherethites (q.v.) are so constantly coupled with the Philistines, or the Pelethites, that they would seem to form a branch of the same family; and there is no good reason to doubt that the Cherethites are Cretans. The Zeus Cretagenes in Gaza points to a connection of the Philistines with Crete. That Caphtor is the same as the Egyptian Kaft (= Cilicia) is by no means certain. Even if the original text in Jer. xlvii. 4 did not have Caphtor, and the word for 'island' is understood to mean Mediterranean coast lands, there is nothing in this passage to forbid the identification.

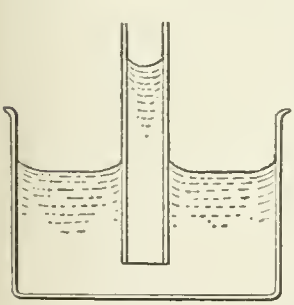
CA'PIAS (Lat., you may take, or seize, from *capere*, to take). A writ in a civil action ordering the officer to whom it is intrusted to seize and take into custody the person of the defendant. Strictly speaking, a *capias* issues only in a common-law proceeding, as distinguished from one in equity. The abolition of imprisonment for debt has greatly diminished the number of cases in which the defendant may be arrested in a civil action, but the right of an arrest in almost all, if not all, of the States still exists where a willful and malicious injury or a fraudulent concealment of property, or proposed evasion of the jurisdiction of the court, is alleged. Usually an affidavit must be presented on which to base the application for a writ of capias. Of the several kinds of this writ the most common are: (1) The *capias ad respondendum*, which directs the sheriff to arrest the defendant and hold him until a certain day at which he is to be brought before the court. Formerly this writ began every action at law; now the cases in which the arrest may be made are limited and defined by the statutes of the States. When used alone the word *capias* usually refers to this form of writ. (2) *Capias ad satisfaciendum*, a writ directing the officer to seize the party to the suit named (this may possibly be a plaintiff, though usually a defendant), and bring his body on a fixed day before the court to satisfy a judgment already issued. It will be seen that this was at the end, as the former writ described was at the beginning, of all lawsuits under the common law; though the use of the writ is now much restricted by statutory limitations, it is still a common-law process; it is familiarly known by the abbreviation *ca. sa.* (3) *Testatum capias*, a supplementary or second writ, issued when an ordinary capias has been placed in the hands of the sheriff and has been returned with the indorsement that the defendant could not be found. In such cases the new writ may be issued after a lapse of time without the introduction of other proof than the producing of the original. None of these writs are common in England or in the United States at present. See ARREST; ATTACHMENT; EXECUTION.

CAP'ILLARIES (Lat. *capillaris*, belonging to the hair, *capillus*, hair, from *caput*, head). The tubes which convey the blood from the left side of the heart to the various parts of the body are termed arteries, while those which return it to the right side of the heart, after it has discharged its various functions in the body, are known as veins. The name of capillary is given to the minute vessels which form the connection between the terminal branches of the arteries and the commencements of the trunks of the veins. These little vessels are of various sizes, some admitting only one blood-corpuscle at a time, while others are large enough to allow of the simultaneous passage of two, three, or more corpuscles. Their average diameter is $\frac{1}{2000}$ to $\frac{1}{3000}$ of an inch; they are smallest in the brain, and largest in the marrow of bone. Their arrangement varies in different parts. In some cases, as in muscular tissue, they run for the most part parallel to one another; in other cases (as around fat-cells) they have a spherical arrangement, and in the skin and in parts of the intestines they form loops; and many other forms of distribution might be mentioned. These various arrangements have been discovered by the microscopic examination of tissues that have been injected and stained with colored fluids.

The circulation of the blood through the capillaries may be readily seen under the microscope in the web between the toes of the hind foot of the frog, in the tongue of that animal, in the tail or gills of the tadpole, in the wing of the bat, etc. See BLOOD-VESSELS; DIGESTION; SECRETION.

CAPILLAR'ITY. That branch of physics which considers the properties of liquid surfaces. The fundamental property of such surfaces is their tendency to contract. This is shown by the fact that a liquid surface always assumes the smallest area compatible with the existing conditions. Thus falling drops of liquids are spherical; and it is known from geometry that the area of the surface of a sphere is less than that of any other solid of an equal volume. If a soap-bubble is not detached from the pipe, it will contract when the mouth of the one who blows the bubble is removed. Again, it requires work to blow a bubble; and this proves that there is a force opposing the increase in area of the bubble. It should be noted that when a soap-bubble is blown, it is not a question of *stretching* the surface, but of making more surface by forcing some of the liquid from the interior out to the surface. (The liquid film finally becomes so thin that this is impossible, and then the surface may be stretched.)

This contracting power of a liquid surface explains the phenomena observed when tubes of fine bore are partially lowered into a liquid. (The word 'capillarity' is derived from this fact, because these tubes must have been comparable with the size of a hair, the Latin word for which is *capillus.*) If the material of the tube is such that it is 'wet' by the liquid, i.e. if when dipped into liquid and then withdrawn there is a liquid film sticking to it (e.g. glass and water), it will be observed that, if the tube is first immersed in the liquid and then placed vertical, only dipping into the surface, the level of the liquid in the tube is higher than that outside by an amount which varies inversely as the radius of the bore. The surface of water inside the tube is like the inside of the finger of a glove, being a lining of the upper portion of the tube and including the top of the liquid column. This surface contracts, rounding off the corners so as to be concave upward, and drawing the column of liquid up the tube, until stopped by the action of gravity on the portion of liquid above the general level. Illustrations of this capillary action are given by the use of blotting-paper, the action of a lump of sugar on water, the action of wicks in lamps and candles, etc.



CAPILLARY ACTION BETWEEN GLASS AND WATER.

If, on the other hand, the solid is one which is not wet by the liquid (e.g. glass and mercury), the level of the liquid inside the tube will, under similar conditions, be lower than that of the level outside. In this case the surface of the liquid in the tube is like the outside of the finger of a glove; and, as it contracts, it rounds off the corners, makes the surface convex upward, and draws the level down. The depression will be found to vary inversely as the radius. The fact that the smaller the radius of a surface, so much the greater is the contracting power, is shown also by another experiment: a tube for blowing soap-bubbles is so made that two bubbles can be blown at one time on opposite ends of a connecting tube; if one bubble is blown larger than the other, and if the bubbles are then left to themselves, it will be observed that the smaller increases in size, blowing out the larger one. This proves that the pressure produced inside the smaller bubble by its contraction is greater than that in the larger. It is seen, therefore, that the pressure varies inversely as the radius; and to start a bubble *ab initio*, i.e. with a radius infinitely small, would require an infinitely great pressure. In fact, it is observed that bubbles of vapor in a boiling liquid or of gas in aërated liquids nearly always have a minute nucleus of dissolved gas to begin on. The presence of a solid with sharp points also facilitates the formation of bubbles, because the liquid surface can start around them. Similarly, the pressure inside a liquid drop varies inversely as the radius; and to start a drop from an infinitely small radius presupposes an infinite pressure. Thus drops of liquid are always condensed around some nucleus, such as a particle of dust or the points of a solid. Drops of rain have, in general, bits of dust inside; dew is formed on rough objects more quickly than on smooth ones, etc.

This contracting power of a liquid surface is greatly affected by the introduction of impurities into the surface and by changes in temperature. Soapy water has less contracting power than pure water; and the motions of bits of camphor or of sodium or potassium on the surface of water are explained by the unequal rates of pollution of the surface at various points of the solid and the consequent unequal alterations in the surface forces, which thus pull the solid bit around in a most random path. If the temperature is raised, the surface forces decrease, as is shown by the fact that the height to which water stands in a glass tube decreases as the temperature increases.

These contracting tendencies of a liquid surface are due to the action of the minute particles of the surface: there are evidently forces holding these particles together. The force acting across a line of unit length is called the 'surface-tension,' and it may be proved that if there is a spherical surface of radius r, there will be a contracting pressure given by the formula

$$p = 2T/r$$

where T is the surface tension of the liquid. Thus, to keep a soap-bubble of radius r from contracting, it is necessary to blow into it with a pressure $4\ T/r$, because there are *two* contracting surfaces in a soap-bubble. Further, if the liquid stands in a tube of small bore at a height h above the general level of the liquid, the hydrostatic pressure due to this height must be counterbalanced by the contracting pressure of the concave surface of the water in the tube. This hydrostatic pressure is pgh, where p is the density of the liquid, and g is the acceleration of a falling body. (See HYDROSTATICS.) Hence,

$$pgh = 2T/r$$

$$\text{or } h = \frac{2T}{pgr}$$

where r is the radius of the tube *at the point at the top of the column of water*, because, strictly speaking, r is the radius of the spherical concave surface of the water, and this equals the radius of the tube at this point if the liquid wets the tube. Therefore, it is entirely immaterial what the radius of the tube is at other points below; the height h remains the same.

For most interesting and instructive descriptions of capillary phenomena, consult Boys, *Soap Bubbles, and How to Blow Them* (New York, 1900).

CAPISTRANO, kä′pê-strä′nō, GIOVANNI (c.1386-1456). An Italian monk, commander against the Turks. He was born at Capistrano, in the Abruzzi. In his early manhood he pursued the practice of the civil and canon law in Naples. In 1416 Capistrano entered the Franciscan Order, and soon attained prominence through the fiery zeal he displayed against non-believers and heretics. He was sent, in 1450, as Papal delegate to Germany to preach against the Hussites and to urge a crusade against the Turks, who threatened western Europe. While in Germany he instigated a persecution against the Jews of Silesia. Having failed in his efforts to unite the German princes in a crusade against the Turks, he collected an army of 60,000 men, which he led into Hungary to the relief of Belgrade, then besieged by the Turks (1456). He led the inhabitants in three successful sorties, cross in hand. He died as a result of his exertions during the siege, and was canonized in 1724, by Benedict XIII. See HUNYADY, JÁNOS.

CAPITAINE FRACASSE, kȧ′pē′tän′ frȧ′kȧs′ (Fr., Captain Hurly-Burly), LE. A romantic novel by Théophile Gautier, published in Paris in 1863, but begun in the author's early manhood. It narrates the adventures of a young man of good family, named De Sigognac, who enters a company of itinerant actors and adopts the title name of the book as his pseudonym.

CAPITAL (Lat. *capitellum*, dim. of *caput*, head). The head or top member of a column, pier, pilaster, etc., when treated as separate from the shaft. For the history and different types of the capital, see COLUMN.

CAPITAL (Fr. *capital*, Med. Lat. *capitala*, from Lat. *capitalis*, pertaining to the head, from *caput*, head: for the origin of the meaning cf. *principal*, in the sense of capital). In political economy, the money, or the property convertible into money, with which a trader carries on his business. Adam Smith defined it as "that part of a man's stock which he expects to convert into revenue." In the wider sense in which the term is employed in political economy, it indicates wealth set apart for purposes of production. In this latter acceptation it is sometimes regarded as the produce of past labor stored up and applied to the maintenance of future labor. This view, however, is not altogether correct, because any body of wealth may be employed as capital, and wealth is not always the result of labor. Thus if a diamond be accidentally found and then sold by its possessor and its produce applied to production, capital has come into existence without further labor than was incidental to the picking up of the stone. Capital is said to be the result of abstinence, since its existence implies that the owner of a certain amount of wealth abstains from the unprofitable consumption of it in order to consume productively, that is in such a way that it shall reproduce itself. But if it reproduce no more than itself there would be no incentive to the possessor to abstain from the consumption of it in his own personal gratification. Consequently he expects a reward for his self-denial. This reward is termed interest, being the remuneration for the use of capital and arising from the fact that the owner foregoes an immediate gratification or surrenders to another an essential agent of production. Wherever something is withheld from immediate consumption, and made to serve in future production, there is capital.

An important fact in the history of capital in modern civilized countries is its constant increase and the consequent lowering of the rate of interest. Capital is, with land and labor, a requisite in the production of wealth, for without some wealth stored up for the subsistence of labor a community could never advance beyond the hand-to-mouth stage of production. In the older school of economists there was no distinction made between the capitalist and the entrepreneur or employer of labor. According to these economists, the capitalist received profits, including not only interest on capital, but compensation for risk and wages of superintendence. Modern writers consider the share of the capitalist merely as the interest on his capital and limit the term profits to the remuneration of the entrepreneur. Belief in the so-called antagonism between labor and capital has been fostered by the writings of the old economists, who held the view that a certain fixed fund, called the wage fund, was set apart by certain economic forces for the payment of labor, and that during a definite period this fund could not be increased. From this it appeared that the interest of the laborer was of necessity opposed to that of his capitalist employer. The demolition of the old wage fund theory and the establishment of the doctrine that wages are paid out of product has done much to remove the misapprehension concerning this hostility between the two factors of production.

Capital may be divided into three elements, subsistence, tools, and material, the first of course being the primary and most essential. Another division is into fixed and circulating capital, the former being that which is tied up in plant, that is, buildings, machinery, etc., and the latter being that portion which is turned over in the course of trade, as in the payment of wages and in the purchase of goods which are soon to be sold again. The concentration of a large amount of fixed capital is one of the reasons which obstruct the operation of the law that capital flows into its most productive channel, for it is obvious that wealth of this sort cannot be readily applied to other purposes and that its owner will prefer to go on selling for a time at a loss rather than to sacrifice his property by suddenly throwing his plant upon the market.

Concentration is the characteristic of the present industrial system. In the light of what has been said it must be evident that this is not necessarily a concentration of capital, or in the ownership of the tools of production, so much as a concentration of the management of these tools. Through the stock company the ownership may be, and frequently is, widely diffused. The advantages of controlling large capital are: First, the cheapening of production by preventing the multiplication of machines and other facilities for industry; second, the extension of the division of labor, the large business being able to organize its forces and find a place for its workmen each according to his abilities more effectively than the small business; third, the prevention of wasteful competition through diminution in the number of the controllers of capital. On the other hand, it tends to reduce the conductor of a small business to the position of a subordinate in a large establishment, thus depriving him of that personal interest in management which may lead to the practice of economy at the same time that it encourages a spirit of independence. Again, the possessor of a large capital is often able to crush out weak competitors, and there is danger lest, after ridding himself of his rivals, he will secure a monopoly price for his product. Looking at these obvious tendencies of the capitalistic system, the Socialists propose that all capital should be socialized, that is to say, administered for the benefit of the community as a whole. They point to this concentration in the control of capital as rendering the change from individual to social ownership an easy step to take, for, the number of owners tending constantly to diminish, there are fewer individuals to be sacrificed through the introduction of a socialistic system. Of the different socialistic theories of capital the most important is that of Carl Marx, the author of the exhaustive work *Das Kapital*. Marx finds no other source of value than labor, and holds that it is through the unscrupulous exploitation of labor that the capitalist employer reaps his so-called profits. The force of unrestricted competition obliges the laborer to accept what terms he can obtain from the employer, who through combination with his fellows seeks always to depress wages to the limit at which they will barely maintain the requisite labor-power. If six hours' work will produce enough to maintain this labor-power and the capitalist can oblige the laborer to work for ten, the four hours' work constitutes what Marx calls surplus labor value which is stolen or 'expropriated' by the capitalist. Arguing in this way, Marx concludes with the advice, "Expropriate the expropriators." Modern economists differ wholly from this view of the origin of value, maintaining that labor is not the sole source, but that value arises in a subjective sense from utility, and in an objective sense through the law of supply and demand. Thus denying Marx's premise, they can not admit the conclusion that remuneration for the use of capital is so much stolen from the product of labor.

For further discussion bearing on this subject, see Interest; Wages; Profits; and Political Economy.

CAPITAL ACCOUNT. A general term employed to designate the amount invested in business enterprises. In bookkeeping practice in the case of a business owned by one person the term is frequently replaced by 'stock,' or by the name of the owner. In the case of firms the capital account is split up into parts, representing the respective investments of the partners. In corporation accounting the capital account may be represented by the capital stock and bonded indebtedness, which are kept as distinct accounts. Popular parlance designates the aggregate capital, whether obtained by subscription to shares, or by borrowing, as the capital account. In railway management, for example, the capital account thus understood stands in contrast to the operating account. See Railways.

CAPITAL PUNISHMENT. Punishment by death. It is generally considered to be the severest penalty which the courts may prescribe, and the number of offenses for which it is inflicted is everywhere diminishing. Indeed, this extreme penalty, notwithstanding the practice of the world from the remotest times down to the present day, has frequently been opposed by philosophers and philanthropists upon religious and ethical grounds, as well as upon those of expediency. Mr. Bentham points out that the death penalty naturally suggests itself in the infancy of a State as the best method of preventing crime, inasmuch as it extirpates the criminals. Such Scripture passages as the words, "Whoso sheddeth a man's blood, by man shall his blood be shed" (Gen. ix. 6), are urged in justification of the death penalty for murder. Beccaria, probably the first modern author of eminence to combat capital punishment, denies the right of government to take human life under any circumstances and maintains that it is a less efficacious method of deterring others than the continued example of a living culprit condemned to repair, by laboring as a slave, the injury he has done to society. The principles of punishment in general have been thus clearly stated by Plato (*Gorgias*, § 525): "Every one who undergoes punishment, if that punishment be rightly inflicted, ought either to be made better thereby and profit by it, or serve as an example to the rest of mankind, that others, seeing the sufferings he endures, may be brought by fear to amendment of life." The question arises, then, does capital punishment deter men from committing those crimes for which it is inflicted? This question can be answered only relatively; for statistics seem to show that the same answer will not be always and everywhere the true one. Death was in former times, in England, the ordinary punishment for all felonies. Blackstone refers to 160 offenses as punishable with death, some of them of a nature which appears to us almost trivial, e.g. cutting down a tree or personating a Greenwich pensioner. Thanks to the exertions of Sir Samuel Romilly, this severe criminal code gave way toward the end of the reign of George III. to more humane conceptions. Since the statute of 1861 there remain in England only four crimes punishable by death—setting fire to the royal dockyards or arsenals, piracy with violence, treason, and murder.

In William Penn's code of laws for Pennsylvania, murder and treason were the only crimes punishable by death, while in the Colony of Massachusetts there were twelve capital offenses. Under the present government, each State has jurisdiction over its own territory, and the laws punishing crime differ in several respects. Capital punishment may be inflicted for treason, murder, arson, rape, piracy, robbery of the mails with jeopardy to the lives of persons in charge, rescue of a convict going to execution, burning a vessel of war, and corruptly destroying a private vessel. In some States, as Michigan, Wisconsin, Rhode Island, and Maine, capital punishment has been abolished. In the States of New York and Iowa, the legislatures, having once abolished the death penalty, felt constrained by the consequent increase of crimes of violence to restore it. Capital punishment has, moreover, been done away with in Holland, Rumania, and Portugal, and since 1863 has been practically abandoned in Belgium. In Switzerland it was totally abolished in 1874, but owing to a marked increase in the number of murders, the cantons in 1879 recovered the right to reëstablish it in their respective territories. Seven cantons again introduced it, although for a number of years no death-sentence was passed. In the remaining fifteen cantons, including more than four-fifths of the population, the death penalty remains totally abolished. In many European countries which still enforce this penalty, only a very small per cent. of those condemned are actually executed.

The method of execution is by hanging in Great Britain, Austria, Russia, and the great majority of commonwealths in the United States; by beheading in Germany and France; and in Spain by means of the garrote. Execution by electricity was introduced in New York by the law of June 4, 1888; it has been adopted in Massachusetts, and will doubtless extend to most of the States. In military law, owing to the necessity for enforcing strict discipline, capital punishment holds a more important place than in the ordinary criminal code. Consult: Copinger, *An Essay on the Abolition of Capital Punishment* (London, 1876); Berner, *Die Abschaffung der Todesstrafe* (Dresden, 1860); Moir, *Capital Punishment* (London, 1865). See PUNISHMENT; PENOLOGY.

CAPITALS. The name applied to letters of larger size than the smaller and more usual characters of the same value in a font of type. Besides differing in size the larger sizes vary somewhat in form from the smaller letters, as in B, b; G, g; R, r. Capitals are normally used only at the beginning of words, although in subject-headings or other special cases they may be employed throughout. Historically, capitals are older than small letters. The immediate ancestors of the European alphabets, the Greek and Roman letters, are not distinguished as to the two classes of letters, all being written alike in large, or majuscule, script. Not only the Greek and Latin inscriptions, but the oldest manuscripts were thus prepared. The same statement holds true still of all Oriental alphabets, in which there is no difference between large and small letters. Gradually there were evolved from the capitals, or majuscles, the small letters, or minuscules. The majuscules, being ill adapted to cursive writing, yielded more and more to the minuscules, which are the sources not only of the small letters, but of the characters employed in handwriting. The use of minuscules gained ground but slowly, and the distinction between capitals and small letters was therefore comparatively late. Gradually, however, after minuscule writing had become the rule, it was thought necessary to denote the initial letters of words which were for some reason especially important, as at the beginning of a sentence, by the proper one of the old majuscules, while the rest of the word, and probably of the sentence, retained minuscule script. In manuscripts the capitals are often richly illuminated, gilded, or made the centre of a small design, frequently of excellent taste. There is, however, no strict rule as to their employment. The same uncertainty holds in early printed books. In the very oldest the capitals were often represented by a space which was afterwards filled in by hand, as in the case of the manuscripts, and in later books the capital, though printed, was colored in imitation of the older usage. In the course of time the capitals, which originally had been used mainly, although not exclusively, at the beginning of a section or paragraph, became more frequent. First the initial word of a sentence began with a large letter to call attention to its importance. Then words within the sentence were treated in the same way. It is noteworthy, however, that it was practically only nouns which were capitalized initially. This usage still survives in Danish and German, which uniformly begin each noun with a capital letter. German, however, is beginning to break away from this rule. English stands in this regard between German and French, with the other Romance languages, Russian, and the like. Each sentence and line of poetry, as well as the first word of a direct quotation, must begin with a capital. Proper names, and all words considered as belonging even temporarily to that category, are similarly treated. This includes names of churches, works of art, religious denominations, societies, and in sporadic instances nouns so strongly individualized as to be practically proper names, and so forth. Examples are, Church of the Transfiguration, Holbein's Head of a Young Man, Mennonites, Liberal League, War of the Rebellion. Titles of books capitalize important words, although library usage departs from this rule. Capitals are also used in names of months and days and the like, as well as in adjectives derived from proper names, in all of which cases French and its cognate languages write the small letter. All names of the Deity and frequently personal pronouns referring to God and Christ begin with capitals. In natural science the names of branches, orders, families, and genera are capitalized, and abbreviations of substantives, excepting weights, measures, and the names of law writs, are written in capital letters. In the use of capitals in English, as in other languages, the individual usage of different writers may vary slightly without seriously contravening the general rules governing the use of this class of letters.

CAPITAN, kä'pė-tän' (It., captain). A stock character in old Italian comedy, doubtless a development of the *miles gloriosus* of the Roman stage. He is a ludicrous blusterer, whose mouth reeks with blood and slaughter, but whose courage fails utterly when put to the test.

CAPITATION (Fr. *capitation*, Med. Lat. *capitatio*, numbering by heads, from *caput*, head). A tax levied on all persons as individuals, irrespective of property or occupation, also called poll-tax. (See TAX.) The former term was often used in France for the tax better known as the *taille*, although this offensive impost was not imposed on all alike, the nobility enjoying many exemptions from it.

CAP'ITO, or **KÖPFEL,** kẽp'fel, WOLFGANG FABRICIUS (1478-1541). A German Protestant

Reformer. He was born at Hagenau, Alsace, studied medicine, law, and theology at Freiburg, and was appointed provost of the Benedictine abbey at Bruchsal in 1512. In 1513 he was appointed preacher and professor of theology at Basel. He entered the service of the Elector Albert, of Mainz, in 1519, and in 1523 became provost of Saint Thomas, Strasburg. Here he declared in favor of the Reformation, and subsequently took a prominent part in the Synod of Bern (1532) and the Concordia of Wittenberg (1536). He drew up, with Bucer, the *Confessio Tetrapolitana*. Consult Baum, *Capito und Bucer* (Elberfeld, 1860).

CAPITOL (Lat. *Capitolium*, from *caput*, head). The citadel of ancient Rome, and site of the national sanctuary, the temple of Jupiter. It was situated on the *Mons Capitolinus*, the smallest but most famous of the seven hills on which Rome was built. The hill consists of two summits, of which the south was the Capitolium proper, containing the great temple of Jupiter, while the north was the citadel (*arx*), though the whole hill is often called Capitol. The natural abruptness of the sides was increased by artificial means, and the whole was strongly fortified. It does not seem to have been the site of the earliest settlement, but to have been chosen later as the common citadel for the settlers of the Palatine and Quirinal, as the Forum was the common meeting-place. The foundation of the great temple of Jupiter Optimus Maximus, Juno, and Minerva was attributed to Tarquinius Priscus, and its dedication to the consul Horatius, B.C. 509. For the foundations great substructures were needed, and in all later rebuildings the same general arrangement seems to have been retained. The building was nearly quadrangular, with three rows of columns in front and one at each side, but none in the rear. The building consisted of three simple *cellæ*, one for each divinity. During the civil wars under Sulla the temple was burned, and after its restoration it was destroyed during the Vitellian riots. It was rebuilt by Vespasian, after whose death it was again destroyed by fire, but was once more restored by Domitian. Domitian's structure lasted to a late period of the Empire, but was so completely destroyed that little remains except the foundation walls. From that portion of the mount named the Tarpeian Rock State criminals were thrown down.

Besides the great temple of Jupiter, the most important structures on the Capitoline Mount were the temple of Jupiter Tonans, built by the Emperor Augustus, and the magnificent Tabularium, built by Quintus Catulus B.C. 73, for the archives, and of which the imposing foundations still remain. On the *arx* was the temple of Juno Moneta, and near by the mint. The north summit is now occupied by the Church of Santa Maria in Aracœli, the south by dwellings, including the German embassy. The Piazza di Campidoglio occupies the space between the two summits, with the Palazzo del Senatore on the site of the ancient Tabularium, and on either side the museums of the Capitol, and of the Palazzo dei Conservatori. See CAMPIDOGLIO.

In the United States, the name is applied to the seat of the Federal legislature (see WASHINGTON), and to the State houses of the several States. Many of these are imposing and costly buildings, notably those at Albany, Hartford, and Austin. See illustration accompanying article ALBANY.

CAP'ITOLINE GAMES. Annual games instituted B.C. 390, according to Livy, in commemoration of the preservation of the Roman capital (citadel) from the Gauls. They were in charge of the guild of the Capitolini, whose members were chosen from those who lived on the Capitol. They seem to have been discontinued in later times, and never to have been an important popular festival. In A.D. 86 Domitian instituted Capitoline games on the Greek model, which were held every four years down to a late period of the Empire. See CAPITOL.

CAPITOLINE HILL. See CAPITOL.

CAPITOLINE MUSE'UM, THE. A small but valuable art collection in a palace built by Michelangelo and situated on the left of the Piazza di Campidoglio, Rome. It was founded toward the end of the Fifteenth Century by Sixtus IV., by the donation to the public of the Papal art collection, and was greatly enriched by Innocent X., Benedict XIV., Clement XIII., and Pius VI. It contains many interesting sarcophagi, also some famous antique statues, among which latter are "The Dying Gaul," "The Resting Satyr" of Praxiteles, "Leda With the Swan," and "Cupid and Psyche," and, finally, one of the most complete collections in existence of busts of the Roman Emperors. An extension has recently been made to the palace, to contain sculpture found on the Esquiline since 1870.

CAPITOLINE WOLF. An ancient bronze in the Conservatori Museum in Rome, representing the suckling of Romulus and Remus by the she-wolf. The figures of the boys are modern, but the wolf stood with other works of art near the Lateran from the fall of the Empire. From the Eleventh to the Fifteenth Century, trials and executions were held at the place where the wolf stood. It was removed to the Palace of the Conservatori in 1473.

CAP'ITOLI'NUS, JULIUS. A Roman writer of the Third Century A.D. To him are ascribed the biographies of the Emperors Antoninus Pius, M. Aurelius, L. Verus, Pertinax, Albinus, Macrinus, the Maximini, the Gordiani, Balbinus, and Pupienus, included in the *Augustan History* (q.v.).

CAPIT'ULARIES (Fr. *capitulaire*, Med. Lat. *capitulare*, from *capitulum*, chapter, from *caput*, head). A term used for the orders and constitutions published by the Frankish kings. The name was derived from the fact that these constitutions were divided into chapters (Lat. *capitula*). It is probable that the capitularies were usually the personal work of the ruler, assisted by his councilors; but in some cases the assembly of nobles was consulted, and for one class (see below) the assent of the people was necessary. Only nine capitularies of the Merovingian rulers are extant. Those of the Carolingians, especially those of Charles the Great, are very numerous. They may be divided roughly into three classes: (1) Constitutions for the whole Empire, regulating the military service, administration, finance, and justice, the relations with the Church, and the personal conduct of the subjects. (2) Special constitutions intended to complete or modify the law of some one of the peoples in the Empire. These were called *Capitula per se scribenda*, and for them the assent of the people concerned was necessary. (3) Capitularies for the *missi*, i.e. the special itinerant officials whose duty it was to act as the immediate representatives of the Emperor. Sometimes these were personal instructions: at other times, general orders to be promulgated to the people.

During the reign of Louis the Pious, Ansegisel, Abbot of Fontenelle, made a collection of the existing capitularies. A little later (before 858), Benedict the Levite published a second collection, which purported to contain the capitularies and some canons of councils. In reality it is made up of extracts from many sources, chiefly canon law, Roman law, and capitularies. There has been much controversy about this subject, and there seems to be some connection between his collection and the False Decretals. There were three other incomplete collections of little importance made soon after. Of modern editions there are four: Baluze, *Capitularia Regum Francorum* (Paris, 1677 and 1780); Walter, *Corpus Juris Germanici Antiqui* (3 vols., Berlin, 1824), in which the capitularies are contained in the second and third volumes; Pertz, *Monumenta Germaniæ Historica, Leges*, Vols. I and II. (Hanover, 1835-37); and Boretius, id. *Legum Sectio II.*, Vols. I and II. (Hanover, 1883-97). The last is by far the best.

CAPITULATION (Fr. *capitulation*, from Med. Lat. *capitulare*, to capitulate, from *caput*, head), MILITARY. The surrender of an armed force, fortress, or beseiged town, to another armed force on previously fixed terms or stipulations. When it is considered no longer advisable to maintain the defense, notification is made to the besiegers, either by signal, white flag, or messenger, and negotiations are entered into to decide on the basis of the surrender. The stipulations finally decided on will be governed by the circumstances surrounding the surrender.

CAPIZ, kȧ-pēth'. The capital of the province of the same name, on the island of Panay, Philippines (Map: Philippine Islands, G 8). It is situated on the coast, at the mouth of the Rio Panay, and has the most important harbor in the province. Highroads connect the town with Iloilo and Antique. Capiz was founded in 1716. Population, in 1898, 13,676.

CAP'LIN, or **CAPELIN** (Fr. *caplan*, *capelan*, of unknown origin). A small fish (*Mallotus villosus*) of the smelt family (Argentinidæ) abundant on both shores of Arctic America, occurring south as far as Cape Cod. It is a very delicious food-fish, and is dried and exported to Great Britain to some extent. The eggs are deposited in incredible numbers in the sand along the Arctic shores, are washed by the waves upon the shore, where they hatch, and where the fry are washed back into the sea. It is of great importance to the people of Labrador and Newfoundland, and of southern Alaska. See Plate of WHITEFISH, SMELTS, ETC.

CAPMANY Y DE MONTPALAU, käp-mä'nē ē de mōnt'pȧ-lou', ANTONIO DE (1742-1813). A Spanish philologist and antiquarian, born in Barcelona. He at first entered the army and served in the campaign against Portugal. Afterwards he assisted Pablo de Olavide in his attempt to colonize the Sierra Morena, an enterprise which terminated disastrously, however, and Capmany went to Madrid, where he was made secretary of the Royal Academy of History in 1790. When the French took possession of the city in 1808 he fled to Seville and assisted in the Spanish war of independence. In 1812 and 1813 he was a member of the Cortes of Cadiz. His numerous publications, which are widely read in Spain, include the historical works *Memorias históricas sobre la marina, comercio y artes de la antigua ciudad de Barcelona* (4 vols., 1779-92); *Código de las costumbres marítimas de Barcelona* (2 vols., 1791), a translation from the Catalan original; and *Cuestiones criticas sobre varios puntos de historia económica política y militar* (1807), all of which contain valuable details on the commerce, industry, and maritime laws of the Middle Ages. He is probably even more celebrated for his literary and philological works, the *Filosofía de la elocuencia* (1812, and often re-edited); *Teatro histórico-crítico de la elocuencia castellana* (5 vols., 1786-94), republished as *Tesoro de prosadores españoles* (5 vols., 1841); and his *Diccionario francés-español* (1805). His works are considered models of pure Castilian, which he always strove to preserve. Consult Sempere y Guarinos, *Ensayo de una biblioteca española* (6 vols., Madrid, 1785-89).

CAP'NOMAN'CY (Fr. *capnomantie*, from Gk. *καπνός*, *kapnos*, smoke + *μαντεία*, *manteia*, divination). A form of divination practiced either by observing the smoke from incense burned for this purpose, or more commonly in connection with a sacrifice. (See SUPERSTITION.) If the smoke was thin, and ascended in a right line, instead of being blown back by the breeze, or spreading over the altar, the augury was good.

CAPOBIANCO, kä'pô-byäṉ'kô. The founder and leader of the Carbonari (q.v.).

CAPO DI MONTE, kä'pô dē mōn'tȧ (It., head of the mountain). A place near Naples, where, in 1736, Charles III., King of Naples, caused an establishment to be set up for the production of soft porcelain. The King took so lively an interest in ceramic art that he even worked with his artists. The first porcelains made at Capo di Monte are said to be such a perfect imitation of the finest Japanese products that they might be mistaken for them. Charles's son, Ferdinand IV., who succeeded him when he left the throne of the Two Sicilies for that of Spain, taking many of the staff of the porcelain-works with him, failed in successfully continuing the fabrication, and it finally sank during the political crisis of 1821.

CAPODISTRIA, kä'pô-dēs'trē-ȧ (Slav. *Kopar*). A fortified seaport town of the Austrian Crownland of Istria, situated on a rocky island in the Gulf of Triest, 8 miles southwest of the city of Triest (Map: Austria, C 4). It is connected with the mainland by a stone causeway. Its principal industries are fishing and shipbuilding, and it has a considerable trade in sea-salt, oil, and wine. Population, in 1890, 10,706; in 1900, 10,711. Capodistria was known to the Romans as Ægida, and later as Justinopolis. In the Thirteenth Century it came into the possession of Venice, and in 1797 of Austria.

CAPO D'ISTRIA, or **CAPODISTRIAS**, JOHN ANTHONY, Count (1776-1831). The President of the Greek Republic from 1827 to 1831. He was born in Corfu, February 11, 1776, of a family which had come from the Illyrian town of

Capo d'Istria, near Triest, in the Fourteenth Century. He devoted himself to political life, and after holding a high position in the Republic of the Ionian Islands (q.v.), he entered the diplomatic service of Russia. He took an active interest in the movement for the liberation of Greece, but was always identified with the Russian party. (See GREECE.) In 1827 he was elected President of Greece; and in January, 1828, he entered upon the duties of his office. He was an able diplomat and was sincerely concerned for the welfare of his native country, but his intimate association with Russia, whose ambitious designs so complicated the whole Eastern Question (q.v.), made him unfit for the place to which he was called. Greece was torn by factions, and the most patriotic Hellenes were suspicious of Russia, and therefore of Capo d'Istria. The President had been much imbued with the centralizing principles prevalent at the Russian Court, and some of his measures, especially that restricting the liberty of the press, gave offense to advocates of civil liberty. In the latter part of his administration he suspended the Constitution of 1827 and ruled as dictator. He was assassinated at Nauplia, October 9, 1831, by George and Constantine Mavromichalis, whose family were leaders in the revolt against his dictatorship and the Russian influence. Consult Mendelssohn-Bartholdy, *Graf Johann Kapodistrias* (Berlin, 1864).

CAPONIERE, kăp'ō-nēr', or **CAPONNIÈRE**, kȧ'pō'nyâr' (Fr. *caponnière*, Sp. *caponera*, cage for fattening fowls, from *capon*, capon). In fortification, a parapet 8 or 10 feet high, with a superior slope, terminating in a small glacis. It is placed in the ditch of a fortified place, to cover or screen the defenders while passing from one defense work to another. See FORTIFICATION.

CAPOTE, kȧ-pōt' (Fr., dim. of *cape*, from Med. Lat. *cāpa*, cape). A long cloak with a hood, worn in southern Europe by soldiers, sailors, and travelers. In the Levant the capote is an outer garment, worn both by men and by women, and made either of rough cloth or of skins, retaining their hair. It is described by Curzon, in *Visits to the Monasteries of the Levant* (London, 1849), as "a sort of white frock coat, without sleeves, and embroidered in bright colors down the seams."

CAPOUL, kȧ'pōōl', JOSEPH AMÉDÉE VICTOR (1839—). A French tenor, born in Toulouse. He graduated at the Conservatoire in Paris, and sang with much popular success at the Opéra Comique. Subsequently he sang in London with Christine Nilsson, in New York with Patti, and in Vienna and Saint Petersburg.

CAPPADOCIA, kăp'pȧ-dō'shĭ-ȧ (Gk. *Καππαδοκία*, *Kappadokia*, OPers. *Katpatuka*). In ancient geography, an extensive region in the east of Asia Minor. It was a Persian province; after the death of Alexander the Great formed for about three centuries a kingdom under a Greek dynasty; and finally, in A.D. 17, became a Roman province. It was bounded by Lycaonia and southern Galatia on the west, by Cilicia and Commagene on the south, by Armenia on the east, and by Galatia and Pontus on the north. During the time that it belonged to the Persian Empire, however, Cappadocia included what was afterwards Pontus, which was called Lesser Cappadocia. The northern part of Cappadocia (in the narrower sense) was traversed by the Halys (Kizil Irmak), near whose banks the Argæus Mons (Arjish) towers to a height of over 13,000 feet. Among the towns were Mazaca (Cæsarea), Comana, Tyana, and Melitene. The population of ancient Cappadocia and Lycia, represented now by the primitive mountain tribes called Taktadji, is of considerable anthropological interest, since some authorities have connected them with the Hittites. They seem to have been Aryans closely related to the Armenians, although Brinton (1895) thought there was an element belonging to the peoples of the Caucasus revealed in their ancient inscriptions and local dialects. Sergi (1901) disputes the Hittite relationship on craniological grounds. The chief literature of the subject is to be found in Von Luschan and Petersen's *Reisen in Lykien* (Vienna, 1889); Von Luschan's article on the "Tachtadschy," in the *Archiv für Anthropologie* for 1901; and Chantre's *Recherches anthropologiques dans l'Asie occidentale* (Lyons, 1895). There is also an interesting article by J. W. Crowfoot on "Survivals Among the Kappadokian Kizilbash," in the *Journal of the Anthropological Institute* (London, 1900).

CAPPEL, kȧ'pĕl', LOUIS (Lat., Ludovicus Cappellus) (1585-1658). A French Hebraist and critic, born at Saint Elier. He studied theology at Oxford and Saumur, was appointed professor of Hebrew at Saumur in 1613, and professor of theology there in 1633. In his *Arcanum Punctationis Revelatum* (1624) he showed that vowel points had been introduced into Hebrew writing at a period comparatively late. As this theory seemed to attack the authority of the Scriptures, it was violently opposed, in particular by Buxtorf. He is considered one of the founders of biblical criticism. His principal work is *Critica Sacra* (1650). Consult Schnedermann, *Die Controverse des Ludovicus Capellus mit den Buxtorfen*.

CAPPONI, kȧp-pō'nē, GINO (1792-1876). An Italian historian and statesman. He was born in Florence, and came of an illustrious family. Devoted to science and philanthropic endeavor, he early gained the confidence of the citizens, and in 1848, although blind, he was called to the head of the administration in Tuscany. Attacked by the Radicals, he retired to private life in a short time. After the war of 1859 he was made a Senator, and chairman of the committee relating to historical researches in Tuscany, Umbria, and the Marches. He was one of the founders of the *Antologia Italiana*, and after its suppression in 1832 established the *Archivo Istorico Italiano* in Florence. As a member of the Accademia della Crusca he assisted in preparing new editions of the academical dictionary called the *Vocabolario degli accademici della Crusca*, and after he had become blind prepared, with Becchi, Borghi, and Niccolini, an improved edition of Dante's *Divina Commedia* (Florence, 1837). Among his other publications, mention should be made of his *Storia della repubblica di Firenze* (2 vols., 1875), the first political history of the republic, after that of Machiavelli. For his life, consult: Tabarrini, *Gino Capponi* (Florence, 1879); and Von Reumont, *Gino Capponi, ein Zeit- und Lebensbild* (Gotha, 1880).

CAPPS, Edward (1866—). An American classical philologist, born December 21, 1866. He received the degrees of A.B. at Illinois College (1887), and Ph.D., Yale University (1891). He was tutor in Latin at Yale from 1890 to 1892; assistant professor of Greek at the University of Chicago from 1892 to 1896; associate professor from 1896 to 1900; and professor in 1900. He is the author of *From Homer to Theocritus* (New York, 1901), and numerous philological papers.

CAPRARA, kȧ-prä'rȧ, Aeneas Sylvius, Count (1631-1701). An Austrian general, born in Bologna. He entered the military service of the Empire, fought under Montecuculi against the French and the Turks, and in 1674 received an independent cavalry command. He was vanquished by Turenne at Sinsheim, but distinguished himself at Ensisheim, and continued in the Rhine campaigns until 1678. In 1683 and succeeding years he was active in the defense of Hungary against Turkish invasion. Appointed vice-president of the council of war at Vienna, he persisted in obstructive attacks upon Prince Eugene.

CAPRARA, Giovanni Battista, Cardinal (1733-1810). An Italian ecclesiastic, of the family of the Counts of Montecuculi. He was born in Bologna, and early entered the career of ecclesiastical diplomacy, acting as nuncio at Cologne, Lucerne, and Vienna. He was named cardinal by Pius VII., in 1792, in recognition of his service in the last post, one of peculiar difficulty under Joseph II. In 1793 he was made Bishop of Jesi, and in 1801, on Napoleon's express request, legate *a latere* in Paris. Here he conducted the very arduous negotiations which ended in the Concordat. Napoleon nominated him as Archbishop of Milan, and was crowned by him there with the Iron Crown of Lombardy in 1805. He continued to reside in Paris in the discharge of his duties as legate until they were terminated by the imprisonment of the Pope. He died there, July 21, 1810, leaving his whole fortune to the hospital in Milan.

CAPRERA, kȧ-prā'rȧ (It., goat island). A rocky island off the north coast of Sardinia. 5 miles long and about 2 miles broad (Map: Italy, D 6). It is famous as having been at various times the place of residence of Garibaldi, who died there June 2, 1882. It supports but a small population.

CAPRI, kä'prē (Lat. *Capreæ*, from *caper*, goat). A beautiful rocky island in south Italy, at the southern entrance to the Bay of Naples, 3½ miles west of Cape Campanella—from which it is separated by the Bocca Piccola—and 20 miles southwest of the city of Naples (Map: Italy, D 12). It is 4½ miles long, 3 miles wide, 10½ miles in circumference, 5¾ square miles in area, and has over 6200 inhabitants. The highest point is Mount Solaro, on the south coast, 1920 feet above the sea, commanding a fine view of the bays of Gaeta, Naples, and Salerno, with the Apennines in the background. The indigenous flora is rich in variety, and there are many trees which have been made to flourish by the perseverance of the inhabitants. Capri has always been celebrated for its delightful climate and pure air, and although the supply of drinking-water is unsatisfactory, it is visited yearly by over 30,000 strangers, who in spring and winter unpleasantly crowd the numerous hotels. It is a favorite summer resort for residents of Naples. Capri (population, in 1901, 4114), the capital of the island and an episcopal residence, is splendidly situated between two cliffs 460 feet high. From the Marina Grande, north of the town, where is found the only good landing-place on the island, there is daily communication by steamboat with Naples and Sorrento. Anacapri (population, in 1901, 2110), which is 880 feet above the sea, on a plateau in the western and more fertile part of the island, is reached by a winding road cut through the rock and completed in 1876. Previously it was necessary to climb a flight of several hundred steps, which have recently been restored. The town is commanded by the ruins of the Castle of Barbarossa, named after the pirate who destroyed it in 1544. On the shore north of Anacapri, and 1¼ miles west of the Marina Grande, is the famous Blue Grotto (Grotta Azzurra), which is entered from the sea by a narrow opening not more than 3 feet high. The grotto is 175 feet long, 100 feet broad, and 41 feet high, with water 48 feet deep. It was forgotten during the Middle Ages, and rediscovered in 1826. Near the Marina Grande is the ancient Church of San Costánzo, the patron saint of the island, whose festival is celebrated on May 14. The church marks the site of the ancient town, which pirates forced its citizens to abandon in the Fifteenth Century. In the northeast corner of the island are the precipitous rocks, 745 feet high, from which tradition says Tiberius hurled his victims into the sea, and the ruins of the twelve villas built by Tiberius in honor of the twelve gods, in the largest of which (Villa Jovis) he passed the last ten years of his life. Augustus had built palaces and aqueducts on the ancient Capreæ, and these Tiberius improved. The English captured the island in 1806, during the Napoleonic wars, and built fortifications, some of which remain. In 1808 they lost it to the French under Lamarque; but recovering it in 1813, restored it to King Ferdinand IV. of Sicily. Local products comprise fine white and red wine, oil, oranges, lemons, and figs, fish, and quails, which, tiring in their migratory flight between Africa and the north, are captured here in nets. The United States is represented by a consular agent. Consult: Gregorovius, *Die Insel Capri* (Leipzig, 1897); Allers, *Capri*, illustrated (Munich, 1894); Furchheim, *Bibliografia dell' isola di Capri* (Naples, 1899); Weichardt, *Das Schloss des Tiberius und andere Römerbauten auf Capri* (Leipzig, 1900).

CAPRICCIO, kȧ-prē'chō̂ (It., caprice, probably from It. *caprio*, Lat. *caper*, goat). A kind of picture composed without regard to the ordinary rules of pictorial art, whimsical and fanciful in idea and arrangement. The artist is not confined here to recording the natural aspects of nature, but rather the reverse, such as foliated ornaments in which human and other figures are introduced in attitudes and situations not strictly natural.

CAPRICCIO. In music, a species of free composition whose form is not subject to rigid rule. The fancy of the composer is allowed free play, his aim being to produce piquant and striking effects, in both melody and harmony, so as to give expression to the ever-changing, fleeting moods in which he composed the capriccio.

CAP′RICOR′NUS (Lat., goat-horned, from *caper*, goat + *cornu*, horn). The Goat, a southern constellation, and the tenth sign of the zodiac (q.v.), denoted by the sign ♑, representing the crooked horns of a goat. It is usually represented on the globe as having the fore part of a goat, but the hinder part of a fish. It is one of the least striking of the zodiacal constellations. It was, however, celebrated among the ancients, who regarded it as the harbinger of good fortune, and as marking the southern tropic or winter solstice, wherefore they called it the 'Southern Gate of the Sun.' It contains no large stars, the two largest, which are situated in the horns, being only of the third magnitude. See TROPICS.

CAP′RIFICA′TION (Lat. *caprificatio*, from *caprificare*, to ripen figs by the stinging of the gall-insect, from *caper*, goat + *ficus*, fig). A method which has long been employed in the Orient for securing and hastening the maturation of figs, and which consists in suspending fruit-bearing branches of the wild fig or caprifig above or beside those of the cultivated tree. A small hymenopterous gnat (*Blastophaga grossorum*) crawls from the caprifig into the Smyrna fig of commerce, and, being covered with the pollen of the wild fig, fertilizes therewith the cultivated fig. If pollen is not introduced, the figs fail to develop, and finally fall to the ground. When pollenized, the seeds develop and the fruits grow to their proper size and mature. The fig-insects were introduced into California in 1899, with the result that fifteen tons of Smyrna figs, of excellent flavor, were harvested in 1900. See FIG.

CAP′RIFOLIA′CEÆ (Neo-Lat., Med Lat. *Caprifolium*, from Lat. *caper*, goat + *folium*, leaf). An order of dicotyledonous plants, consisting of shrubs and herbs which have opposite leaves without stipules, and flowers disposed in corymbs, in heads, or in whorls. The calyx is four to five cleft; the corolla, tubular or wheel-shaped, sometimes irregular. The stamens are inserted on the corolla at its base, and alternate with its lobes. The ovary is free, one to five celled. The fruit is generally a berry, sometimes dry, but not splitting open when ripe. The order is very nearly related to Rubiaceæ, differing chiefly in the want of stipules. More than two hundred species are known, chiefly natives of the temperate and colder parts of the Northern Hemisphere. To this order belong the honeysuckle, elder, viburnum, and snowberry (qq.v.), the chief genera being Lonicera, Sambucus, Viburnum, Symphoricarpus, Linnæa, Diervilla, etc.

CAP′RIMUL′GIDÆ (Neo-Lat., from Lat. *caper*, goat + *mulgere*, to milk). A family of birds, including the whippoorwills, nightjars, etc. The family is usually called 'goatsuckers,' but the name 'nightjar' is better. See NIGHTJAR.

CAPRIVI, kȧ-prē′vē, GEORG LEO, Count von. The second Chancellor of the German Empire. He was born February 24, 1831, at Charlottenburg, studied in Berlin, and in 1849 volunteered in the Kaiser Franz Grenadiers. During the campaign in Bohemia in 1866 he was made a major and a member of the general staff of the First Army Corps. He distinguished himself during the Franco-Prussian War, and as chief of staff of the Tenth Army Corps served with distinction at Metz and Orléans and in the Loire campaigns. His advance in rank and in responsible commands was rapid. In 1882 he was appointed commander of the Thirtieth Infantry Division at Metz; in March, 1883, he was selected by Bismarck to succeed Admiral Stosch as Chief of the Admiralty, greatly to the dissatisfaction of the officers of the navy. He justified the judgment of the great Chancellor, however, by his mastery of the details of the department and his successful reorganization of the navy upon its present basis. He gave much attention to the perfection of torpedoes and torpedo-boats, and arranged a plan for the more rapid mobilization of the war-vessels. In 1888 he resigned, and was made commander of the Tenth Army Corps, stationed in Hanover. He received the Order of the Black Eagle, and in March, 1890, succeeded Bismarck as Chancellor of the Empire and president of the Prussian Ministry. He was made a count in 1891. Succeeding, as he did, the most powerful statesman in Europe at the beginning of the reign of restless William II., Count Caprivi's position as Chancellor was one of many trials and great difficulty. Nevertheless, he showed himself an able and faithful administrator. He carried the bill for an increase in the army through the Imperial Reichstag; initiated a policy of reciprocity, through treatises with Austria-Hungary, Italy, Belgium, and Russia, in spite of the narrow opposition of the Prussian landowners; and maintained a moderate policy with reference to the growing Socialist Party. In July, 1890, he arranged with Lord Salisbury, representing England, the so-called Anglo-German partition of East Africa. (See GERMANY.) He resigned the presidency of the Council in 1892, and the Chancellorship in 1894. Caprivi was, like Bismarck, a man of great physical strength and possessed considerable mental power, with a great capacity for work. He died on his estate, Skyren, in Brandenburg, February 6, 1899.

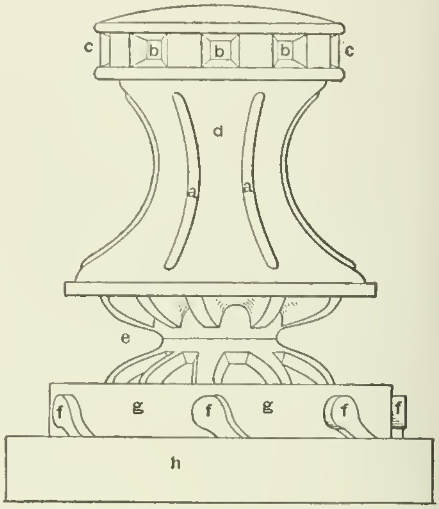
CAPRO′IC, CAPRYL′IC, and CAP′RIC ACIDS. Acids represented respectively by the formulæ $C_6H_{12}O_2$, $C_8H_{16}O_2$, and $C_{10}H_{20}O_2$, and members of the acetic or fatty acid series. They are found in butter and in other fats. They derive their names from *capra*, a goat, in consequence of their more or less resembling in smell the odor of that animal. They may be obtained, along with butyric acid, another member of the fatty-acid series, by boiling (saponifying) butter with caustic potash.

CA′PRON, ALLYN (1846-98). An American soldier, born in Tampa, Fla. He graduated at the United States Military Academy in 1867, and rose to be captain of artillery in 1888. During the Sioux campaign of 1890 he served with distinction, and in 1898 during the Spanish-American War participated in the invasion of Cuba. On July 1 he opened the battle of El Caney by firing, as commander of Battery E, First Artillery, upon the stone fortifications which lined the ridge. He died of typhoid fever contracted during the campaign.

CAPS and HATS (Swed. *Mössorna och Hattarne*). Names of political parties in Sweden in the early part of the Eighteenth Century. The Caps were in favor of stripping the monarch of all semblance of authority: the Hats wished the King to retain some measure of power. In foreign affairs the Caps were friendly to Russia, while the Hats favored a French alliance. The Hats were the aristocrats, the Caps constituted the popular party.

CAP'SICUM (Neo-Lat., from Lat. *capsa*, box, from *capere*, to hold). A genus of plants of the natural order Solanaceæ, having a wheel-shaped corolla, projecting and converging stamens, and a dry berry. The species are all of a shrubby, bushy appearance, and have more or less woody stems, although they are annual or biennial plants. About ninety species have been named. They are natives of tropical America, have simple leaves and rather inconspicuous flowers, and some of them are in very general cultivation in tropical and sub-tropical countries for their fruit, which is extremely pungent and stimulant, and is employed in sauces, mixed pickles, medicine, etc., often under its Mexican name of *chiles*. The fruits of different species differ in form, being round, oval, conical, heart-shaped, etc.; they vary from half an inch to 4 inches in length, and are sometimes of a bright red, sometimes of a yellow color. In all, the dry berry has an inflated appearance, and contains numerous whitish, flattened seeds, which are even more pungent than the leathery epidermis or the spongy pulp. Cayenne pepper consists chiefly of the ground seeds. *Capsicum annuum*, sometimes called common capsicum or chilli-pepper, is, perhaps, the most common species in cultivation. *Capsicum frutescens*, sometimes called goat-pepper, and *Capsicum baccatum*, sometimes called bird-pepper, have great pungency, and the former is generally described as the true Cayenne pepper. *Capsicum cerasiforme*, with a small, cherry-like fruit, and therefore called cherry-pepper, and *Capsicum grossum*, with a large, oblong, or ovate fruit, known as bell-pepper, are frequently cultivated. The fruit is used either ripe or unripe, except for making Cayenne pepper, for which dried ripe fruit is employed. See PEPPER.

CAPSTAN (Fr. *cabestan*, Sp. *cabestrante*, probably from Lat. *capistrare*, to tie with a halter, from *capistrum*, halter, from *capere*, to hold). A machine used on shipboard for handling the anchor and other heavy weights. It was formerly made of wood, with iron fittings, but is now generally of iron. It consists of the *barrel*, *drum-head*, *wildcat*, *pawl-head*, and *spindle*. The axis of the capstan is vertical, and is formed of an iron or steel spindle. The barrel is not cylindrical, but is smaller at the centre, toward which the upper and lower ends curve. This curve causes a rope which is wound round the barrel to slip toward the centre as it is pulled in by the capstan in turning. To increase the friction around the barrel, ridges, called *whelps*, extend up and down its surface. Around the circumference of the drum-head are square holes extending in toward the centre to a depth of several inches, forming sockets for inserting the capstan-bars, which stand out when in place like the spokes of a wheel. The bars have scores or grooves in the outer ends, through which is passed a small rope called the *swifter*, that serves to keep the bars in place. A capstan-bar of ordinary size is sufficiently long to permit three or four men to push against it in *heaving*. The wildcat is a deep groove between the lip on the lower end of the barrel and the pawl-head, and is designed to grip the chain which rests in it for about half the circumference. To prevent the chain from slipping, there are, on the upper and lower sides of the groove, ridges or whelps extending radially, and growing thicker and higher as they approach the axis. These whelps catch between the links of the chain that stand vertically, and so prevent the latter from slipping. On the circumference of the pawl-head are pivoted the *pawls*, which are short bars of iron working in a *pawl-rack* in the *capstan-bed*, which is bolted to the deck. To *walk back* the capstan, or reverse the motion, it is necessary to lift these pawls and throw them over, so that they will act only in the opposite direction. Wooden capstans, of very similar form to those now used, but without the wildcat, were devised by Sir Thomas Moreland in 1661. In the days of rope anchor-cables they were hauled in by means of a messenger, as the cable itself was too large to be worked around the capstan-barrel. The messenger was a smaller rope, which was gripped to the cable by rope *nippers*. It led to the barrel of the capstan and back again to near the hawse-pipe. The nippers were taken off one by one as they approached the capstan, and others put on farther forward. After the introduction of chain cables, messengers continued to be used until the invention of the wildcat enabled the chain to be brought directly to the capstan. In steamers, capstans are now generally worked by steam power; but they are rapidly being displaced by steam *windlasses*, which resemble two capstans placed base to base, with the axes horizontal. See ANCHOR.



CAPSTAN.

a, whelps on the barrel; *b*, sockets or pigeonholes for capstan-bars; *c*, drum-head; *d*, barrel; *e*, wildcat; *f*, pawls; *g*, pawl-head; *h*, base containing pawl-rack.

CAPSULE (Fr., from Lat. *capsula*, little box, *capsa*, box, from *capere*, to hold). A dry, dehiscent fruit, made up of more than one carpel. Sometimes it contains but a single chamber; in other cases there are as many chambers as there are carpels. The methods of dehiscence are numerous, but quite uniform within a plant group. Capsules are often called 'pods,' a more inclusive term. The term is also sometimes applied in a general way to spore-cases. See FRUIT.

CAPSULE. A term in medicine for a thin membranous covering, casing, or envelope, like a pouch or bag, containing some part or organ. The capsule of the kidney is a smooth, fibrous membrane closely investing the kidney and forming its outer coat. The capsule of the lens of the eye is a transparent, elastic, brittle, and structureless membrane. The word is also extensively used for a small gelatinous case or envelope in which medicines are inclosed before administration, to prevent the patient's tasting an unpleasant drug, or for convenience of carrying, as well as to secure a more soluble coating than that of many pills.

CAPTAIN (OF. *capitain*, Med. Lat. *capitaneus*, from Lat. *caput*, head, chief). A title found in almost every language to denote a chief of a small number of men. In the United States Army, a captain ranks next above a first lieutenant and below a major, and commands a company, troop, or battery. A captain present for duty with his command is responsible for its discipline and efficiency. He is accountable for the public property that constitutes its equipment: for the proper performance of duties connected with the subsistence, pay, and clothing of its members: and for the correct keeping and rendition of all company accounts, reports, and returns. The captain recommends the non-commissioned officers of the company, who are appointed by the colonel, and from the sergeants he selects the first sergeant. In camp or barracks the captain maintains a careful supervision over the cooking and messing of his men, and is responsible for the camp and garrison equipage, and the arms and the clothing of his company. See ARMY ORGANIZATION; and RANK AND COMMAND.

A captain in the navy is the commanding officer of a man-of-war, and in most navies this title is given to officers next in rank to rear-admirals. Its origin as a naval title is disputed, but it seems to have come into use about the time that war-vessels took on their present character by combining the navigating with the fighting force; previous to this the master (which is still the proper designation of the commander of a merchant ship) had charge of the navigation, in which he had sailors to assist him; while the fighting was done by soldiers put on board for the purpose and commanded by a military officer. In the British Navy the rank was first clearly defined in 1747, and those captains who commanded post-ships (i.e. rated ships), if of three years' standing, took rank with colonels of the army, and they appeared as post-captains in the royal navy list until 1824. Before and since this latter date, in the British Navy and in that of the United States, the name post-captain was used to distinguish commanding officers of frigates and larger ships from commanders and master-commanders who were called *captain* by courtesy. Until 1862 the rank of captain was the highest in the United States Navy (see ADMIRAL), but captains who had commanded squadrons were addressed by the courtesy title of commodore. According to the order of the President of June 7, 1901, captains may be ordered to command a division of ships, a vessel of the first rate, or second rate, or one not rated. The number of captains on the active list of the United States Navy is, by law, seventy, but this number is exclusive of those who may have been promoted one or more numbers for service during the war with Spain. They rank with colonels of the army and receive the same pay while at sea ($3500, with an addition of 10 per cent. for each five years of service until the maximum of $4500 is reached), but while on shore duty receive 15 per cent. less.

CAPTAIN, THE. A play by Fletcher, assisted by either Jonson or Middleton, or both, published in folio in 1647. Its earliest recorded production is May 20, 1613, when Hemings's company appeared in it at Court. It contains the dainty lyric "Come hither, ye that love."

CAPUA, kăp'ū-ȧ, *It. pron.* kä'pōō-ȧ. An archiepiscopal city of south Italy, in the Province of Caserta, in a fertile but unhealthful situation on the left bank of the Volturno, 18 miles north of Naples (Map: Italy, J 6). As the only fortress guarding Naples on the north, it was of great importance to the former Kingdom of Naples. In the Seventeenth Century its defenses were greatly extended and improved by Vauban. The cathedral, dating from the Eleventh Century, but almost entirely modernized, has in the entrance court granite columns from ancient Casilinum, on whose site Capua was built, in the Ninth Century; in the Church of the Annunziata are ancient bas-reliefs; and beneath the arch of the Piazza de' Giudici—the marketplace—are many ancient inscriptions. The Museo Campano contains reliefs and inscriptions from the amphitheatre of ancient Capua, ancient and mediæval sarcophagi, and various statues, heads, coins, etc. On the bridge over the Volturno—restored in 1756—is a statue of Saint Nepomuc; the Torre Mignana inside, and the Cappella de' Morti outside the town, commemorate the bloody attack on Capua in 1501 by Cæsar Borgia. Not far from the city is the field where the soldiers of Garibaldi and of Piedmont defeated King Francis II. of Naples, October 1, 1860. For ancient Capua, see SANTA MARIA CAPUA VETERE. Population, in 1881, 14,000; in 1901, 14,285.

CAPUANA, kȧ-pwä'nȧ, LUIGI (1839—). An Italian critic, novelist, and dramatic writer. Together with Giovanni Verga, he has long stood at the head of the small group of Italian realists, or *verists*, as they choose to style themselves. He was born at Mineo, May 27, 1839, chose journalism as a profession, and became dramatic critic of the Florence *Nazione*. He first attracted attention by publishing a volume of his theatrical criticisms, *Il teatro italiano contemporaneo* (1865), vigorously attacking many mediocre but highly successful plays of that period. In 1877 he went to Milan and joined the staff of the *Corriere della Sera*, the leading evening paper in that city. Two years later *Giacinta*, his most important novel, appeared, followed by a long series of volumes, chiefly of short stories, which include *Storia Fosca* (1882); *Homo* (1883); *Fumando* (1889); *Profumo* (1881); *Le paesane*; *La sfinge*. He has also published several volumes of literary criticism. Edouard Rod devotes an interesting chapter to Capuana in his volume, *Giacomo Leopardi* (Paris, 1888).

CAPUCHIN, kăp'û-shēn' *or* kăp'û-chĭn, THE. A comedy by Samuel Foote, produced at the Haymarket, August 17, 1776, and published in octavo 1778. It is a modification of the same author's *Trip to Calais*, and is aimed at a creature of the Duchess of Kingston. (See VIPER, DR.; also KINGSTON, ELIZABETH, DUCHESS OF.) Foote played the part of O'Donovan in it. Its performance was stopped by the public censor, but the attack was continued in *The Bankrupt*.

CAPUCHIN (kăp'û-shēn') **MONKEY** (It. *cappuccino*, Franciscan friar, because of the cowl-like black spot on the head). Any sapajou of the genus Cebus, but more specifically the 'weeper' (*Cebus capucinus*), one of the common species in northern Brazil, and often kept in captivity. See SAPAJOU, and Plate of AMERICAN MONKEYS, under MONKEY.

CAPUCHINS (Fr. *capucin*, Sp. *capuchino*, from It. *capuccio*, cowl, Med. Lat. *caputium*, *capitium*, from *caput*, head). A branch of the Franciscan Order of friars, whose rule is essentially the same as that of the Friars Minor, or Minorites. They were founded at Montefalco, in Umbria, by Matteo di Bassi, an Observantine Franciscan, who in 1525 left his monastery in order to live the stricter life of a hermit. This he was permitted to do by Pope Clement VII. in 1526. Being imprisoned at Ancona for his alleged disobedience to monastic order, he was released through the influence of the Duchess of Camerino, niece of the Pope, and he and his companions, in 1528, were allowed to wear beards and peculiar, long-pointed hoods (hence the name), to impart their habit to any one who might be willing to join them, to live as hermits in wild and desolate places, to go barefoot, and to call themselves the "Hermit Friars Minor." They grew rapidly, and had great success in making converts. After the Jesuits, no order has attracted to itself so many men of the highest birth as this, in which poverty is pushed to its utmost extreme. They have always paid much attention to learning, and have produced a number of considerable theologians. Five have been canonized and six beatified. The order reached its greatest development in the Eighteenth Century: in 1775 it had sixty-four provinces with 31,000 members, a number which has never since been reached. They are most numerous in Austria, but have twenty-two apostolic mission districts in all parts of the world. In the United States they have two provinces, one with its chief house in Detroit, Mich., and fifty-six fathers, and the other centred in Pittsburg, Pa., with forty-eight fathers. To Protestants, the best known Capuchins are Bernardino Ochino, who was converted to Protestantism in 1542, and Father Theobald Mathew, the famous Irish apostle of total abstinence. There are also Capuchin nuns, founded in Naples, 1538, who are properly a branch of the Clares (q.v.), insisting strongly on poverty, and following as far as possible the Capuchin constitution. Consult *Bullarium Capucinum* (7 vols., Rome, 1740-52), brought up to date in three supplementary volumes (Innsbruck, 1883-84).

CAP'ULETS and **MON'TAGUES**. The English forms of the names of the Cappelletti and Montecchi, two noble families of Verona, chiefly memorable from their connection with the legend on which Shakespeare founded *Romeo and Juliet*. They are mentioned by Dante (*Purgatorio*, vi. 106) in connection with Albert of Hapsburg, King of the Romans, who was murdered in 1308. This event has supplied the Veronese with a date for their legend. Implicitly believing the story, they point out the house of Juliet's parents and her tomb. The legend is undoubtedly Eastern in origin, having analogues in the stories of Pyramus and Thisbe, Hero and Leander, and Abrocomas and Anthia (as related in the *Ephesiaca* of Xenophon of Ephesus, a writer of the Second Century A.D.). The incident of the sleeping potion was, moreover, quite common in late Greek romance. So far as is known, the essentials of the story reached Italy late in the Fifteenth Century, appearing in a short novel by Massuccio of Salerno, first published in 1476. We come more closely to the outline of Shakespeare's play in the novel *La Giulietta*, by Luigi da Porto, printed in 1535, after the death of the author. He states, in an epistle prefixed to the work, that the story was told him "by one Peregrino, a man fifty years of age, much experienced in the art of war, a pleasant companion, and, like almost all the Veronese, a great talker." Da Porto, then, was the first to claim that the story was based on fact. This was a common make-believe of the Sixteenth Century story-tellers. In 1554 Bandello published in his collection of tales another Italian version of the legend. It was entitled *The Unfortunate Death of Two Unhappy Lovers—One by Poison and the Other of Grief*. Both writers fix the date of the event by saying it took place when Bartolomeo della Scala ruled Verona (1301-04). A French version of the tale was published by Pierre Borsteau in his *Histoires tragiques* (1559). It was translated into English in 1567, and published in Painter's *Palace of Pleasure*. Five years before, Arthur Brooke published an English poem on the same subject, entitled *The Tragical History of Romeus and Juliet, written first in Italian by Bandell, and now in English*. Shakespeare seems to have founded his tragedy on Brooke's poem, with some use of Painter's version. Yet there is some evidence that the story had been dramatized before the appearance of Shakespeare's play. In that case, Shakespeare probably made use of his predecessor. It was Brooke who first called the Montecchi 'Montagues,' and the Prince of Verona 'Escalus,' instead of Scala. Wright and Cary, in translating Dante, have followed the example of Shakespeare, and rendered the Italian names of the *Divina Commedia* into the familiar "Capulets and Montagues" of *Romeo and Juliet*. The historical date of the tragedy has not, however, been adopted by modern stage managers, who very properly bring down the action from the beginning to the close of the Fourteenth Century, when commercial opulence and the revival of arts and letters supply accessories more in keeping with the drama than the ruder age to which history must assign the 'civil broils,' and the fall of the Capulets and the Montagues. Consult: Daniel, "Originals and Analogues of Romeo and Juliet," in *New Shakespeare Society Publications* (London, 1875); or the Variorum edition of *Romeo and Juliet*, by H. H. Furness (Philadelphia, 1871).

CAPULETTI ED I MONTECCHI, kä'pōō-lĕt'tê âd ê môn-tĕk'kê (It., Capulets and Montagues). An opera by Bellini, produced in 1830, in Venice, founded on Shakespeare's *Romeo and Juliet*.

CA′PUT MOR′TUUM (Lat., dead head). In historical research a term which denotes the residuum of a traditional narrative after all the supernatural or extraordinary incidents have been cast aside. What remains may be possible or likely, but rests on no evidence. In chemistry the term was formerly used of the residuum of chemicals after the volatile substances had escaped. It is still used metaphorically for a thing or institution which has been really destroyed, though the form is left, the essential and valuable elements having been removed.

CAPYBARA, kä′pē-bä′rȧ (Sp., Portug., from the native name), or Carpincho. A large South American aquatic rodent (*Hydrochœrus capivara*) of the family Caviidæ. It is about four feet long and weighs nearly 100 pounds, thus making it the largest known rodent. It resembles a gigantic rough-coated guinea-pig, having a heavy flat head, with small eyes and ears, and a blunt muzzle. The short, stout legs have hoof-like claws on the feet; the tail is very short, and the brown hair is scant and bristly. The capybara feeds exclusively on vegetable food, browsing on the grass near the rivers, and often committing great ravages in plantations of sugar-cane. It runs badly, but swims and dives well, and has the power of remaining under water for seven or eight minutes. It is very inoffensive, easily tamed, and regarded as stupid. The flesh, except that of old males, is good. The capybara is known throughout Spanish South America as 'carpincho,' but is called in British Guiana 'water-hog,' and 'water-horse,' a corruption of the more suitable Dutch *waterhaas*, i.e. water-hare. Consult *Proceedings of Zoölogical Society of London* (1894). See Plate of Cavies, etc.

CARABAO, kä′rȧ-bä′ō. The domestic buffalo of the Philippines. See Buffalo, and compare Tamarao.

CAR′ABAS, *Fr. pron.* kȧ′rȧ′bȧ′. Marquis of. The fortunate but not wholly obedient master of "Puss in Boots," in Perrault's fairy-tale of the latter name. The name has also been used by Disraeli, in *Vivian Grey*, to label a caricature of an obstinate nobleman in contemporary English life.

CARAB′IDÆ (Neo-Lat. nom. pl., from Gk. κάραβος, *karabos*, horned beetle). The largest family of Coleoptera. See Ground-Beetles.

CAR′ABINEERS′. See Carbineers.

CARACAL, kăr′ȧ-kăl (Fr., from Turk, *qara*, black + *qulaq*, ear). A slender, red-brown cat of Africa and Southern Asia, related to the lynx (q.v.).

CAR′ACAL′LA (188-217). Emperor of Rome from 211 to 217. His real name was Bassianus. He was the son of Septimius Severus and Julia Domna, and was born at Lugdunum (Lyons), April 4, A.D. 188. His father playfully nicknamed him *Caracalla*, because he was found of wearing a long, hooded mantle, so called in the Gallic language. In 193 his father became Emperor, and three years later, on the overthrow of Albinus, the last of the rivals to the throne, Caracalla was declared *Cæsar*, or heir presumptive. In 197 he was made *pontifex* and co-Emperor in 198, at the age of ten years, taking the name Marcus Aurelius Antoninus. At this early period of his life Caracalla showed no signs of that reckless and brutal nature which characterized his later years. He married Plautilla, daughter of the pretorian prefect Plautinus, in 202, and during the rest of his father's reign Caracalla accompanied him on his expeditions, notably to Britain, where Severus died at Eboracum (York) in 211. Caracalla now returned to Rome and associated his younger brother, Geta, in the government; but, unable to endure an equal, he killed Geta in the very arms of their mother on February 27, 212, and ordered his name to be erased from all public monuments. Caracalla now vented his mad rage on all the friends and adherents of his brother by a wholesale butchery, in which the great jurist Papinianus perished. At the same time he ordered the death of his wife, the Empress Plautilla.

The rest of his reign as sole Emperor was occupied largely with military campaigns on the frontiers; against the Chatti and Alemanni in Germany (213), the Iazyges in Thrace (214), and in the farther East. He was killed on the road to Carrhæ, in Mesopotamia, April 8, A.D. 217, at the instigation of Macrinus, the prefect, who succeeded to the throne. The great Baths of Caracalla—*Thermæ Antoninianæ*—in Rome, of which extensive ruins stand to-day on the Appian Way, were built during his reign.

CARACALLA, Baths of, or Thermæ Antoninianæ. Celebrated baths at Rome, of which impressive ruins remain. They were built about A.D. 212, partly on the remains of former buildings disclosed by recent excavations, and were completed by Heliogabalus and Severus. The group of buildings consisted of a central structure, containing immense halls, surrounded by gardens and enclosed by a square formed by smaller buildings, the whole covering an area of more than 129,600 square yards. Water for the baths proper was supplied by the Marcian aqueduct. The walls and columns are of immense thickness. The great surface of the ceilings was reduced in weight by the use of pumice-stone in place of bricks; the walls were covered with marbles, and the floors with mosaic. Underground passages, extending in all directions, were used by a large body of attendants for the speedy service of the guests, of whom 1500 could be accommodated at the same time. The recovery of many celebrated statues shows how lavishly the baths were adorned with works of art.

CARACALU, kä′rȧ-kä′lo͞o. The capital of the District of Romanati, Rumania, 30 miles southeast of Krajova. It has some fine public buildings and a domestic trade. Population, in 1899, 12,035.

CARACARA, kä′rȧ-kä′rȧ (imitation of its harsh cry). The Brazilian name of certain large, vulture-like hawks of South and Central America, which have very long, naked legs, the head somewhat crested, and the cheeks bristly, the plumage chiefly black and white, and handsomely arranged. They walk about on the ground, feeding on carrion, and where food is abundant gather into vast flocks. Of much service as scavengers, in the cattle-herding regions of South America they have increased greatly and developed many interesting traits. They erect in trees or on cliffs bulky nests of sticks and leaves, and lay only two eggs, heavily blotched and spotted. They constitute a subfamily of the Falconidæ, which contains six genera, of which the most important are Polyborus and Ibycter. The former has three species, one of which, the carancho, is the common 'carrion-hawk' of Argentina and Brazil, while that now most commonly called 'caracara' is *Caracara cheriway*, which ranges from Ecuador to the southern border of the United States. Their names (compare Chimango) are imitative of their hoarse cries. Consult: Sclater and Hudson, *Argentine Ornithology*, Vol. II. (London, 1889); and Darwin, *A Naturalist's Voyage* (London, 1860).

CARÁCAS, kȧ-rä'kȧs. The capital of Venezuela and an episcopal city, situated 6 miles south of La Guayra, its port, in latitude 10° 31′ N. and longitude 67° 5′ W. (Map: Venezuela, D 1). The city lies in a fertile valley, 3000 feet above sea-level, and enjoys a mild climate. Its streets are broad and straight, crossing each other at right angles, and its principal square, the Plaza Bolívar, with an equestrian statue of Bolívar in the centre, is surrounded by the Government buildings, the university, the cathedral, and the episcopal palace. Other notable buildings are the national museum and the public library. Besides the university, there are numerous educational institutions, such as the medical school and the military school. There are also several learned societies, and associations for the promotion of agriculture and industry. Carácas does little manufacturing, but is the centre of the export trade of the district, which produces cacao, coffee, tobacco, etc. The city is the seat of a United States consular agent. Population, in 1891, 72,429. Carácas was founded in 1567 as Santiago de León de Carácas, and prospered greatly because of its favorable situation. It was twice destroyed, in 1595 and in 1766, but continued to grow, and played an important part in the war of independence against Spain. The great earthquake of 1812 killed 12,000 persons and laid half the city in ruins. The last serious shock occurred in 1900.

CARACCI, kȧ-rä'chē. See Carracci.

CARACCIOLO, kä'rȧ-chō'lō, Francesco (c.1748-99). A Neapolitan admiral. He entered the navy at an early age, and distinguished himself at Toulon, in 1793. In the year 1798 he abandoned Ferdinand, and entered into the service of the Parthenopean Republic, established by the French invaders, and with a few vessels prevented the attempted landing of a Sicilian and British fleet. In 1799, when Cardinal Ruffo took Naples, Caracciolo was arrested, contrary to the terms of capitulation, sentenced to death by the Junta and hanged on the mast of a frigate. His corpse was thrown into the sea. For Caracciolo's fate Lord Nelson, influenced by the notorious Lady Hamilton, was largely responsible.

CARAC'TACUS, or **CARAT'ACUS** (c.A.D. 50). A king of the Trinobantes who dwelt north of the Thames, and who were the masters of southeastern Britain when Claudius began his conquest in the year 43. When the Trinobantes were defeated, and their capital, Camalodunum (Colchester), was taken by the Romans, Caractacus retreated, but kept up the struggle until 51. In that year he was overthrown in a pitched battle, his wife and children were captured, and he was delivered to the Romans by Cartimandua, Queen of the Brigantes, to whom he had fled for refuge. Caractacus was sent to Rome, where he had to remain until his death. Tacitus in the *Annales*, Book vii. Chapter 37, places an eloquent and dignified speech in the mouth of Caractacus when he stood in bonds before the Emperor.

CARAC'TACUS. (1) A play, "written on the model of the ancient Greek tragedy" by William Mason, published in 1759, in quarto. It was done into Greek by George Henry Glasse in 1781. In 1805 it was republished in the octavo collection of the author's works. The *London Quarterly Review* (xv. 376-387) designated it as "a beautiful dramatic poem, with much fancy, some tinsel, great classical taste, and an entire unfitness for representation."

(2) A tragedy of J. R. Planché, produced in 1837. It is founded on Fletcher's *Bonduca*.

CARACTÈRES DE THÉOPHRASTE, kȧ'rȧk'târ' de tȧ'ō'frȧst'. A work by La Bruyère based on his translation of the character sketches by Theophrastus, which he extended and adapted to the customs of his own day. These studies were increased from 386 to 1100 in number in the various editions from 1688 to 1696.

CAR'ADOC, or **CRAD'OCK.** A member of the Round Table in Arthurian legend. One of the thirty-one knights selected by Merlin to accompany Arthur to Carohaise, to help King Leodegran against King Ryance of Ireland, who was about to attack that monarch with fifteen tributary kings. His wife was the heroine of the episode of *The Boy and the Mantle*.

CARADOC SANDSTONE. A heavily bedded sandstone, so named from its development at Caer Caradoc in Shropshire. With the Bala slates and sandstones, which are geologically equivalent, it constitutes the uppermost division of the Ordovician system of England. The Caradoc and Bala beds are fossiliferous, and have been used largely as the basis of comparison in geological study. Their formation was accompanied by extensive volcanic action; lavas and tufas are included within their limits, and in the Snowden region these rocks attain a thickness of several thousand feet.

CARAFA, kȧ-rä'fȧ, Michele (1785-1872). An Italian composer, born in Naples of a noble family. He served as a cavalry officer under Murat (then King of Naples) in the Russian campaign of 1812, but after 1814 resumed the study of music and brought out operas in Naples, Milan, Venice, Rome, and Paris. After 1827 he lived in Paris, where he became a member of the Academy of Fine Arts, professor at the Conservatory, and director of the Gymnase de Musique Militaire. Among his numerous works are *Le solitaire* (1822) and *Masaniello* (1827).

CARAFE, kȧ-räf' (Fr., from It. *caraffa*, a decanter, probably from Ar. *ghirāf*, vessel, *gharafa*, to dip up water). A water-bottle or decanter for the table or toilet, a term long in use in Scotland, but of later introduction into England and the United States.

CARAGAS, kȧ-rä'gȧs. A Visayan dialect of eastern Mindanao. See Philippines.

CARAGLIO, kȧ-rä'lyō, Giovanni Jacopo (c1498-c.1570). An Italian designer and engraver, born in Parma. He studied in Rome, and is supposed, from a certain quality of style, to have been a pupil of Marc Antonio Raimondi. For some time he was at the court of Sigismund of Poland, where he became well known as a gem-cutter. About sixty of his plates (on copper), many of them after Raphael, have been preserved. Most of them are excellent in design.

CARAMBOLA, kä'râm-bō'lȧ (East Indian word). An East Indian fruit, of the size and shape of a duck's egg, but with five acute angles or longitudinal ribs. It has a yellow, thin, smooth rind, and a clear, watery pulp, in some varieties sweet, in others acid, of very agreeable flavor. It is often used in making sherbets, and in tarts and preserves, and is known to the British in India as the *Coromandel gooseberry*. It is one of the most universally cultivated and abundant of the fruits of India. It is produced by the *Averrhoa carambola*, a small evergreen tree or bush of the order Oxalidaceæ or Geraniaceæ, according as these orders are considered, some botanists combining them into the latter. The bilimbi, blimbing, or cucumber tree, so called from the shape of the fruit, is the very acid fruit of another species of the same genus, *Averrhoa blimbi*, also East Indian. Both species are now much cultivated in the tropical parts of America, the first to a limited extent in southern California. Both exhibit an irritability of leaf resembling that of a sensitive plant; they also display in a remarkable degree the phenomena known to physiologists as the sleep of plants (q.v.).

CARAMEL (Fr., from Med. Lat. *calamellus*, strictly *cana mellis*, cane of honey, but considered to be dim. of Lat. *calamus*, cane). The name applied to the dark-brown and nearly tasteless substance produced on the application of heat to sugar. It is likewise formed during the roasting of all materials containing sugar, such as coffee, chicory, and malt, and is one cause of the dark color of porter and infusions of coffee. It is largely employed in the coloring of whisky, wines, vinegar, soups, gravies, etc. The name is also given to a kind of confectionery.

CARAMNASSA, kä'râm-näs'sȧ. See KARAMNASSA.

CARANCHO, kȧ-rän'chȯ, or **CARANCHA**, -chȧ. See CARACARA.

CAR'APA (Neo-Lat., from Guiana *caraipi*). A genus of plants of the order Meliaceæ, natives of warm climates. *Carapa Guianensis*, sometimes called the Anderaba, also the carapa tree, is a large tree with beautiful shining pinnate leaves, which have many leaflets. It is a native of Guiana and the adjacent countries, where its bark has a great reputation as a febrifuge, and the oil obtained from its seeds is much used for lamps. Masts of ships are made of its trunk. The oil, which is called oil of carapa, is thick and bitter and is anthelmintic. *Carapa procera*, also known as *Carapa touloucouna* or *Guineensis*, an African species, yields a similar oil, which is employed by the negroes for making soap, and for anointing their bodies, its bitterness protecting them from the bites of insects, a purpose to which the oil of carapa is also applied in South America.

CARAPANOS, kȧ-rä'pȧ-nôs, CONSTANTINE (1840—). A Greek archæologist. He was born at Arta and studied at Corfu and Athens. Afterwards he became attaché of the Turkish embassy at Paris, but renounced a diplomatic career to become chief secretary of the Société Générale de l'Empire Ottoman, the first great financial institution to be established in Constantinople by the bankers of the country (1864). In 1876 he began to devote himself to archæology, and promoted the investigations which led to the discovery of the ruins of Dodona, concerning which he wrote the interesting work entitled *Dodone et ses ruines* (1878).

CARAQUETTE, kăr'ȧ-kĕt'. A port of entry in Gloucester County, New Brunswick, Canada, on the Bay of Chaleur (Map: New Brunswick, D 2). It is an ancient Acadian settlement, has a good harbor and important fishing industries. The settlement consists of Upper and Lower Caraquette. Population of parish, about 4000.

CARAT (Fr., from Ar. *qīrāt*, pod, husk, carat, from Gk. κεράτιον, *keration*, fruit of the locust-tree, from κέρας, *keras*, horn). Originally the name given to the seeds of the Abyssinian coral-flower or coral-tree (*Erythrina Abyssinica*). These, which are small, and very equal in size, having been used in weighing gold and precious stones, carat has become the designation of the weight commonly used for weighing jewels, and particularly diamonds. The seeds of the carob (q.v.) tree have also been said to be the original carat weights of jewelers, but with less probability.

Jewelers and assayers divide the troy pound, ounce, or any other weight, into twenty-four parts, and call each a carat, as a means of stating the proportion of pure gold contained in any alloy of gold with other metals. Thus, the gold of our coinage, and of wedding rings, which contains $\frac{22}{24}$ of pure gold, is called twenty-two carats fine, or twenty-two-carat gold. The lower standard used for watch-cases, etc., which contains $\frac{18}{24}$ of pure gold, is called eighteen carat, and so on. The carat used in this sense has therefore no absolute weight; it merely denotes a ratio. This, however, is not the case with the carat used for weighing diamonds, which has a fixed weight, equal to $3\frac{1}{5}$ troy grains, and is divided into quarters, or 'carat grains,' eighths, sixteenths, thirty-seconds, and sixty-fourths. These carat grains are thus less than troy grains, and therefore the jeweler has to keep a separate set of diamond-weights.

CARATHEODORY, kȧ'rȧ'tȧ'ȯ'dȯ'rē', ALEXANDRE. See KARATHEODORI, ALEXANDER.

CAR'ATHIS. The star-gazing mother of Vathek in Beckford's romance of that name.

CARAUSIUS, kȧ-ra̤'shĭ-ŭs (? -293). A Roman usurper, who made himself Emperor of Britain. He was a native of what is now Belgium, and was placed by the Emperor Maximian in command of the Roman fleet at Boulogne. He used his office to secure wealth and power, and connived in the piratical expeditions of the Germans against Britain. In 286 Maximian ordered him to be put to death, but Carausius had already revolted. He went to Britain, secured the allegiance of the Roman soldiers there, and assumed the title of Emperor. For six years he maintained his position, and with his ships commanded the British Channel. After the defeat of a Roman fleet in 289, Diocletian and Maximian recognized him as co-Emperor, but when Constantine was made Cæsar he undertook the subjugation of Britain. Boulogne was taken in 293, and the same year Carausius was murdered by his chief minister, Allectus. The latter was easily conquered by Constantine in 296. Consult Gibbon, *Decline and Fall*, Chapter 13, edited by Bury, with notes (London, 1896-1901).

CARAVACA, kä'rȧ-vä'kȧ. A city of Spain in the Province of Murcia, on a river of the same name, about 39 miles west by north of Murcia (Map: Spain, E 3). It is situated on the slope of a hill crowned with a fine old castle, and has broad and well-paved streets. The municipal building and the parish church, the latter an Ionic structure completed in 1600, are the more noteworthy edifices. The city is in a very fertile region, and has manufactures of linen and woolen goods, brandy, soap, paper, leather, flour, chocolate, etc. Caravaca is a very old town, many ancient remains being found in the vicinity. It was held successively by the Goths, Moors, and Christians; but has occupied in history a place of comparative unimportance. Population, in 1900, 15,804.

CARAVAGGIO, kä'rȧ-vä'jȯ. A town in the Province of Bergamo, Lombardy, Italy, 14 miles south of Bergamo. A steam tramway connects it with Monza and Milan. The site of its ancient fortified walls is now occupied by promenades, but the moat remains and is spanned by six bridges. The chief buildings are a parochial church with a lofty campanile and the church L'Apparizione della Madonna, a celebrated pilgrim resort. The artists Polidoro Caldara, Michelangelo Amerigi, and Fermo Stella were born in this town and all received the surname Da Caravaggio. Francesco Sforza, commanding the Milanese troops, here defeated a Venetian army in 1448. Population, in 1901 (of commune), 8974.

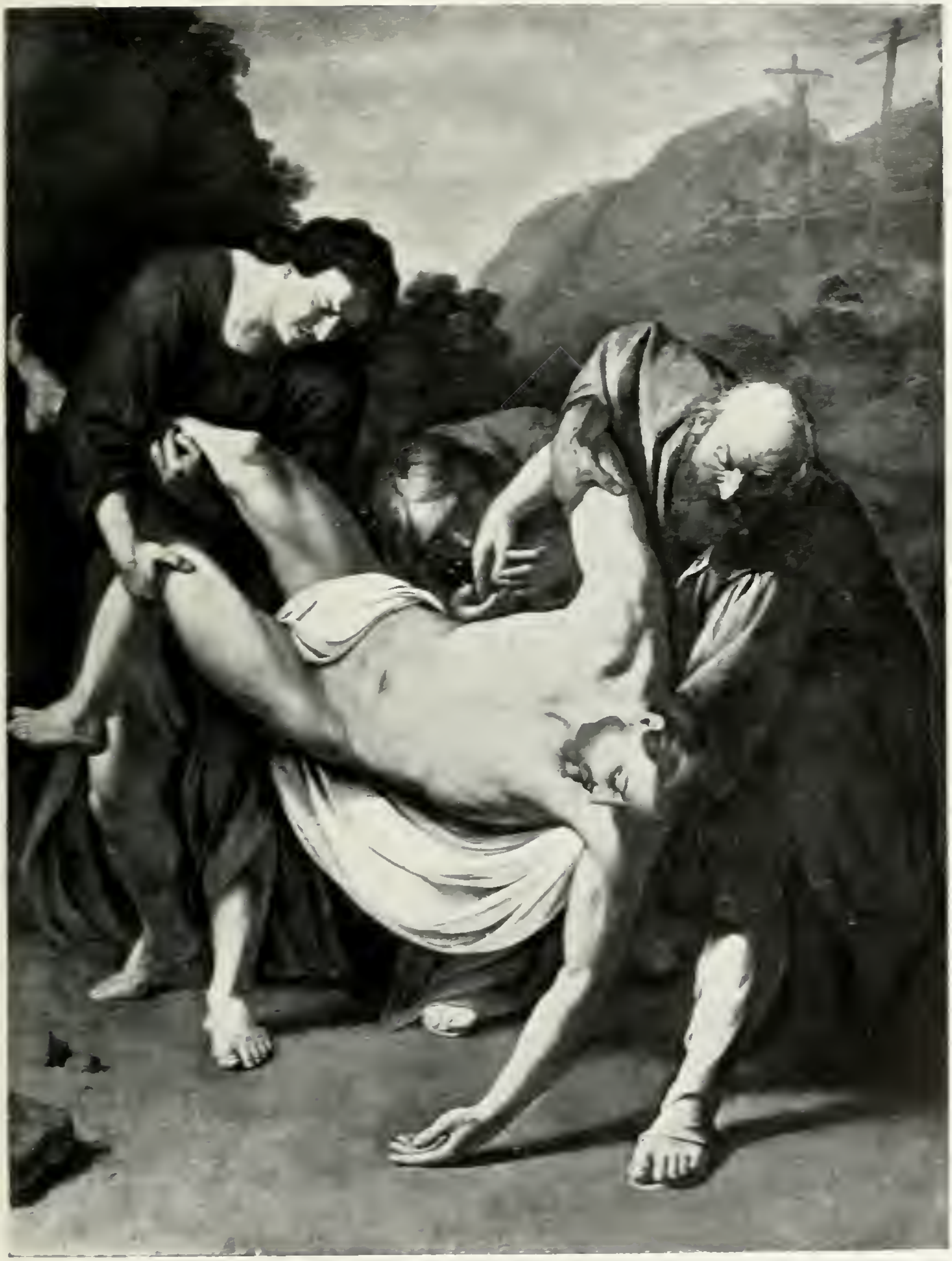
CARAVAGGIO, kä'rȧ-vä'jȯ, MICHELANGELO AMERIGI, MERIGI, or MORIGI DA (1569-1609). An Italian painter, founder of the Naturalistic School. He was born in Caravaggio, Bergamo Province, the son of a stone-mason. As a boy he was employed to prepare plaster for the fresco-painters of Milan, and from them he acquired his desire to become a painter. He does not seem to have studied under any particular master, but to have used nature as a model, confining himself, at first, to still life and portraits. After five years of such work in Milan, he went to Venice, where he studied the works of Giorgione, the only master who influenced him. Thence he went to Rome, and although for a short time associated with Cesare d'Arpino and another unimportant painter, he persisted in going his own way. After much vicissitude he found a patron in Cardinal del Monte, which insured his success.

His talent developed with great rapidity. Throwing all traditions aside, and appealing only to nature, he became the head of the Naturalists, in opposition to the Mannerists. He became very popular, and even the Eclecticists imitated him. But the animosities which he excited and his own passionate disposition involved him in constant quarrels, although he certainly did not provoke all the quarrels attributed to him. Thus he is said to have challenged Guido Reni, who imitated his work, to a duel, and to have chased the inoffensive Guercino from Rome. It is true, however, that he killed a comrade in a quarrel over a game, and had to leave Rome for this offense. He was protected and concealed near Palestrina by Duke Marzio Colonna. He painted for that nobleman until he went to Naples. In this city he found an appreciative public, and from his activity there arose a Naturalist school of great importance. He afterwards went to Malta. Pleased by his portraits of himself, and by his other services to the order, the Grand Master of the Knights of Malta made him one of their number, but when Caravaggio again quarreled and wounded one of the knights, he threw him into prison. The painter escaped, and was for some time occupied in the churches of Catania, Syracuse, and other Sicilian cities. He was always desirous of returning to Rome, and on having been pardoned by the Pope, in 1609, he set out from Naples for the Eternal City. But he was waylaid on the road, and died at Porto Ercole, from the effects of a wound.

Caravaggio's art was like his character—fierce in mood, impetuous in expression. His pictures are full of action and of feeling, not mere painted models, like those of Courbet (q.v.), his Nineteenth Century successor. They resemble his in that they are plebeian: both sought in the common types of the people the models for their pictures, and both insisted on the exact reproduction of these types. There was, however, this great difference, that while Caravaggio saw nature with the extravagant eyes of the Seventeenth Century, Courbet saw it with the matter-of-fact gaze of the Nineteenth. Caravaggio was a good technician, both in drawing, color, and brushwork, and he handled light and shade with fine effect.

His work may be best divided into two periods. In the first he did not make such prominent use of the dark shadows and high lights which characterize his later period, and which became the most prominent characteristic of the Naturalist School. Most of the works of this period are genre pieces, executed during his stay in Rome. One of the best examples is the "Card Players," in which the artist represents a wealthy, inexperienced young man being cheated by professionals. The best example of this picture is in the Sciarra Palace, Rome, although the Dresden replica has been most reproduced. Another fine specimen of his first period is the "Gipsy Fortune Teller," in the Palazzo dei Conservatori, on the Capitoline Hill. The cunning jade seems more anxious to win the young man's heart than to attend to professional duties. The Berlin Museum possesses two charming genre pieces, "Love as a Ruler," "Love Conquered," showing an admirable mastery over the nude.

The works of his second period were mostly larger religious compositions, the result of the reputation already established by his genre productions. They aroused great opposition, especially in Rome, on account of the ordinary types which he used to portray the saints whom the Church adored. Among those which had to be removed from the churches in Rome was "Saint Matthew Writing the Gospel," now in the Berlin Museum, and the admirable "Death of Mary," in the Louvre. In the latter picture the body of the Virgin looks as if it had just come from the morgue, but the expression of grief in the mourners is most affecting. His masterpiece of this category is his "Burial of Christ," painted for the Church of Santa Maria in Trastevere, but



CARAVAGGIO

"THE ENTOMBMENT OF CHRIST"

FROM THE PAINTING IN THE VATICAN AT ROME

now in the Vatican. This work is excellent in composition, the women are noble in expression, and the men are full of character. The body of Christ, though entirely realistic, is a beautiful representation of the nude. Rubens thought this picture worthy to copy and it has been often engraved.

The chief galleries of Europe abound in works of Caravaggio, but not nearly all of those ascribed to him are original. By its acquisition of the Giustiniani collection, Berlin is exceptionally rich, and London has a characteristic example in "Christ and the Apostles at Emmaus." Caravaggio also painted a few portraits, of great realism and force. Of his "Portraits of Himself," the youthful specimen in the Uffizi (Florence) is noted, but his finest piece of portraiture is probably the "Grand Master of the Knights of Malta," in the Louvre.

Although he had no direct pupils, Caravaggio was of the greatest influence upon the development of modern art. Even the principal pupils of the Carracci, like Guido Reni and Guercino (q.v.), studied his art, and Domenichino (q.v.) was influenced by it. He may be justly considered the founder of the Naturalistic School (see PAINTING), and as the advocate of the return to nature, his influence extended beyond Italy into Germany, France, and the Netherlands.

Consult: Baglione, *Le Vite de' Pittori* (Rome, 1649); Bertolotti, *Artisti Lombardi a Roma* (Milan, 1881); Eisenmann, "Caravaggio," in Dohme's *Kunst und Künstler* (Leipzig, 1879); and the article "Caravaggio," in Julius Meyer, *Allgemeines Künstlerlexikon* (Leipzig, 1885).

CARAVAN (Fr. *caravane*, Sp. *caravana*, from Pers. *kārvān*, from O. Pers. *kāra*, people, army). The name given to the great assemblages of travelers which, at stated times, traverse the deserts of Asia and Africa. Most caravans are formed for the purposes of trade, the merchants associating themselves for mutual help and protection. A caravan sometimes has as many as 1000 camels, which follow each other in single file, so that it may be a mile or more in length. The most celebrated caravans are those formed by pilgrims going to Mecca, particularly those which annually assemble at Cairo and at Damascus. The latter consists of thousands of pilgrims and stands under the special protection of the Turkish Sultan. The caravan by which the Persians travel to Mecca starts from Bagdad, and is the vehicle of a very important trade. The great Indian caravan to Mecca, which started from Muscat, has been long given up. The trade between Tripoli and the interior of Africa is exclusively carried on by caravans, likewise that between Darfur and Egypt. The great trade between Russia and China is also a caravan trade. In the East caravans in which the camels have a load of 500 to 600 pounds are called heavy caravans; light caravans are those in which the camels have only half that weight, so that the daily journeys may be longer. Heavy caravans travel from eighteen to twenty miles a day; light from twenty-two to twenty-five. The caravans are generally conducted with great regularity, and assemble at and start from stated places on stated days. The leader of the Mecca caravans is called *emirpel-hadj*, i.e. prince of the pilgrims. In trade caravans a leader, who is called *karwan-bashi*, is elected by the merchants from their own number. In addition to the leader, each caravan has its servants, guides, military escorts, and priest. Obedience is enforced by the leader in the matter of internal discipline, but in trafficking each member is independent.

For a picturesque description of the caravan to Mecca, see Burton, *Wanderings in Three Continents.*

CARAVANSERAI, kä'rȧ-vän'sȧ-rī (Pers. *kārvān*, caravan + *sarāi*, inn), or KHAN. An institution of the East, a sort of unfurnished inn to provide shelter for travelers who journey in caravans, analogous to the dak-bungalows of modern India. It commonly consists of a square building of four wings built round a courtyard, in which the beasts of burden may be inclosed, and where there is a well or spring of water; the lodgings are small rooms, about 7 or 8 feet high, which run round the courtyard, and are bare of furniture. These caravanserais are an institution of very ancient date, being the 'inns' of Gen. xlii. 27, xliii. 21; and it was in the stable of such a place, there being no room for his parents in the lodging apartments, that the Saviour was born. They belong either to the Government, to some private individual, or to the Church (mosques). Those situated on the road are usually free, and the others charge but a nominal fee. There are some large and very handsome caravanserais at Cairo, Damascus, Beirut, Aleppo, etc.

CAR'AVEL, or **CAR'AVE'LA** (Sp., Med. Lat. *carabus*, a boat, Gk. *κάραβος*, *karabos*, light ship). (1) A small vessel formerly much used in Portugal. It was lateen-rigged, with a single square sail on the foremast, and rarely exceeded 150 tons. (2) A small lateen-rigged fishing vessel of ten or fifteen tons used in Spain, Portugal, and the Azores. (3) A large Turkish ship of war. The name was, in Spain and Portugal, formerly applied to larger craft: the caravel of the Fifteenth and Sixteenth centuries was occasionally a ship of 200 or 300 tons burden, with four masts, lateen-rigged on three and square-rigged on one, the foremast. As in vessels of the period, the poop and forecastle of a caravel were very high, especially the former. Two of the ships of Columbus were of the caravel type.

CARAVELLAS, kä'rȧ-vā'lȧs. A town in the Brazilian Province of Bahia, situated on the Caravellas River, 5 miles from its mouth (Map: Brazil, K 7), and connected with the coast by natural canals. It has a good harbor, and is in communication by rail with the interior. The exports consist of fish-oil, coffee, and cocoanuts. Population, over 4000.

CARAWALA, kä'rȧ-wä'lȧ. A crotaline venomous serpent (*Hypnale nepa*) greatly dreaded in southern India. See CROTALIDÆ and Plate of FOREIGN VENOMOUS SERPENTS, under SNAKE.

CARAWAY (Sp. *alcarahueya*, from Ar. *al*, the + *kararyā*, *kararīya*, caraway plant; probably from Gk. *κάρον*, *karon*), *Carum carui.* A plant of the natural order Umbelliferæ, growing wild in Europe and in some parts of Asia. It is cultivated in Europe and in America for its aromatic seeds (carpels), which are used medicinally, and as an aromatic condiment, by confectioners, distillers, and perfumers, in the preparation of liquors, cakes, sweetmeats, scented soaps, and similar products. It depends for its aromatic properties on a volatile oil called oil of caraway, which is obtained by bruising the seeds and distilling them with water. Caraway has a branching stem 1 to 2 feet high, with finely divided leaves, and dense umbels of whitish flowers. It is easy of cultivation. For illustration, see Plate of CAMELLIAS.

CARBAJAL, kär'bä-häl', FRANCISCO (1464-1548). A Spanish soldier, born in Aravalo. He went to Mexico in 1528, was sent by Cortés to Peru in 1536 to assist Pizarro, and was field-marshal to Vaca de Castro in his victory over Diego de Almagro the younger, on the Plain of Chupas. He joined the party of Gonzalo Pizarro in the contest against Diego Centeno and Pedro de la Gasca, was taken prisoner with Pizarro at the battle of Sacsahuana (April 8, 1548), and was hanged and quartered. He was at the time of his death the most brilliant commander in Peru. "He was ruthlessly cruel, but brimming over with wit and humor, so that people said it was quite a pleasure to be hanged by him, for the sake of his witticisms on such occasions." Consult Markham, *A History of Peru* (Chicago, 1892).

CARBAJAL, kär'bä-häl', GASPAR DE, and TOMAS JOSÉ. See CARVAJAL.

CARBALLO, kär-bä'lyô. A town in the Province of Coruña, Galicia, Spain, 30 miles southeast of Coruña. It is noted for its mineral springs and baths. Population, in 1901, 13,544.

CAR'BAZOT'IC ACID. See PICRIC ACID.

CAR'BIDES (*carbon* + *ide*). Compounds of carbon and the metals. The most important carbides are iron carbide and calcium carbide. Molten iron unites directly with carbon to form a series of definite chemical compounds, Fe_4C, Fe_3C, FeC_2, etc. The presence of these compounds, in variable quantities, in metallic iron causes important changes in certain properties of the latter: it becomes hard and brittle, and melts at a considerably lower temperature than pure iron. Even of greater practical importance than iron carbide is the carbide of calcium, now extensively employed in the manufacture of acetylene gas. When treated with water or dilute acids, most carbides are decomposed with formation of hydrocarbons. Thus, the carbide of aluminium yields methane, or marsh-gas; the carbide of calcium yields acetylene. At present the carbides are made by the use of the electric furnace, which gives a temperature of about 4000° C. In this furnace carbon is made to act on the oxide of the metal, when part of the carbon takes up the oxygen of the oxide, while another part combines with the metal. The carbides of the alkali metals, sodium and potassium, are best prepared by passing a current of pure and carefully dried acetylene gas over the melted metals, kept at a temperature of about 225° C., out of contact with the air. The name *carbides* is also applied to compounds of carbon with certain non-metallic elements, such as silicon. The carbide of silicon is a crystalline substance remarkable for its great hardness and used, under the name of carborundum, or silicate of carbon, for making whetstones, polishing cloths, etc. The carbides of non-metallic elements are not attacked by acids. See ACETYLENE; CALCIUM CARBIDE; CARBORUNDUM.

CARBINE, kär'bīn (Fr. *carabine*, It. *carabina*, Med. Lat. *calabra*, war-engine). The firearm carried by mounted soldiers generally. It is the same in principle as the infantry rifle, but, owing to its modified form and length, of much more limited range than the rifle proper. It is carried, as a rule, attached to the saddle by straps, or by a pocket or bucket. See SMALL ARMS.

CAR'BINEERS', or **CARABINEERS** (Fr. *carabinier*, from *carabine*). Formerly a separate and distinct type of cavalry, a distinction which no longer exists. As with many other obsolete types of military corps, the title, and in some instances the distinctive uniform, is still maintained by the various carbineer regiments throughout Europe, this distinction constituting their only real difference from other cavalry. The name is said by some authorities to have originated with the carbine, the firearm with which light cavalry was armed; by others they are said to have derived their designation from the Arabs, among whom the *Carabins* or *Karabins* were light horsemen, stationed at outposts to defend narrow passes, etc.; in action they took the place of skirmishers. Generally speaking, the name was commonly applied to light cavalry regiments, now known as hussars and lancers. See CAVALRY.

CAR'BOHY'DRATES (Lat. *carbo*, coal + Gk. *ὕδωρ*, *hydōr*, water). A name applied in chemistry to one of three groups of substances found in great quantities in the animal and vegetable kingdoms, the other two groups being the fats and the proteids. The carbohydrates should not be confounded with the hydrocarbons: for while the latter are composed exclusively of carbon and hydrogen, the carbohydrates all contain carbon, hydrogen, and oxygen. The last-named two elements are found in the carbohydrates in precisely the same proportion in which they exist in water; so that a molecule of any carbohydrate might be represented as made up of x atoms of carbon and y molecules of water ($x\,C + y\,H_2O$). It is, however, well known at present that the carbohydrates contain no water as such.

The carbohydrates include the different varieties of sugar, of starch, and of cellulose. It appears strange at first that such very different substances should be grouped together: the crystalline and soluble compounds called sugars, and the amorphous, mostly insoluble substances called celluloses and starches. They are all, however, connected by their common capacity of breaking up into the varieties of sugar called saccharoses or monoses, which form the simplest sub-group of carbohydrates. The remaining two sub-groups, the di-saccharoses or bioses, and the poly-saccharoses or polyoses, include some of the most commonly met with, but chemically very complex substances.

THE SACCHAROSES. These include dextrose, levulose, galactose, etc., and may be transformed, by the fermentative action of yeast, into alcohol. They all reduce Fehling's solution (an alkaline solution of cupric oxide). The formula $C_6H_{12}O_6$ represents any one of the saccharoses, the several members of this group being either chemically or optically isomeric. The methods for the study of their chemical constitution were first proposed by Kiliani (1885-87). Emil Fischer has since extended and applied the methods of investigation to a large number of the saccharoses, and as a result the chemical nature of these substances is at present perfectly clear. The saccharoses may, accordingly, be defined as follows: they are optically active chemical compounds, containing several hydroxyl groups (OH), and one carbonyl group (CO) next to one of the hydroxyl groups: some are aldehydes (aldoses), others are ketones (ketoses). They are capable of existing in numerous optically isomeric forms, and a large number of them have been prepared artificially, after the possibility of their existence had been indicated by the theories of stereo-chemistry (q.v.), although many of these isomers are unknown to exist ready-formed anywhere in nature.

THE DI-SACCHAROSES. These include ordinary cane-sugar, milk-sugar, maltose, etc., and are composed of two molecules of some one saccharose, or of some two different saccharoses. Their chemical nature is, however, as yet imperfectly understood. By the action of dilute acids, or by certain processes of fermentation, the di-saccharoses may be broken up into saccharoses, but yeast has no direct action on them. Unlike the saccharoses, the di-saccharoses have no reducing effect on Fehling's solution. The formula $C_{12}H_{22}O_{11}$ represents the composition of any one of the di-saccharoses.

THE POLY-SACCHAROSES. These include starch, cellulose, etc., and are chemically very complex, and as yet very little understood. Like the di-saccharoses, they have no effect on Fehling's solution, and yeast has no direct action on them. The composition of the poly-saccharoses is usually represented by the general formula $(C_5H_{10}O_5)_n$.

The carbohydrates are among the most necessary constituents of food. Their presence has been shown to be indispensable to the formation of fats, and their own value as sources of muscular energy, though smaller than that of fats, is still very considerable.

The value and uses of the most important carbohydrates are discussed in this Encyclopædia under their special names. See CELLULOSE; DEXTRIN; GLUTEN; STARCH; SUGARS; FOOD; etc.

CARBOL'IC (*carbon* + *ol* + *ic*) **ACID**, PHENIC ACID, or PHENOL, C_6H_5OH. An important organic substance largely used as an antiseptic, disinfectant, and deodorant, as well as in the manufacture of certain dyes. It is formed when various organic substances are strongly heated, and is, therefore, found in the tar produced by the destructive distillation of coal, wood, shale, etc. The chief material from which it is made on an industrial scale is the tar obtained in the manufacture of coal-gas. Carbolic acid is extracted from the fraction of coal-tar which distils over between the temperatures 170° and 230° C. This portion, called middle oil, or carbolic oil, is treated with a solution of caustic soda, which combines all the phenol, but at the same time takes up a certain amount of the hydrocarbons contained in the oil. The hydrocarbons are driven off by a current of steam passed through the alkaline solution, and then the still impure sodium salt of phenol is decomposed with dilute sulphuric acid, and the crude phenol thus obtained is rectified in wrought-iron stills. The fraction passing over between 175° and 205° is subjected to further fractional distillation, the final product being practically pure phenol. At ordinary temperatures pure phenol is solid, crystallizing in large, colorless prismatic crystals that melt at 42° C. The melting-point is, however, considerably lowered by the pressure of minute quantities of water. The boiling-point of pure phenol is 183° C. If exposed to the action of the air, carbolic acid gradually assumes a red coloration, which is said to be caused by the presence of minute traces of lead; a permanently colorless phenol may be obtained by oxidizing the impurity with a little potassium permanganate and sulphuric acid. Carbolic acid mixes in all proportions with alcohol, ether, chloroform, glycerin, olive oil, and other organic liquids. It is but sparingly soluble in water, which is itself soluble in phenol only to a limited extent. When water is shaken with phenol in such relative quantities that the limits of solubility are exceeded, the mixture separates into two liquid layers, the upper being a solution of phenol in water, the lower a solution of water in phenol. Weak aqueous solutions of phenol are sometimes used as a gargle, and by adding a few drops of essence of peppermint a pleasant and efficient mouth-wash may be obtained. The aqueous solutions have a sweetish taste, and leave, as an after-taste, a slightly burning sensation in the mouth. Solutions of phenol in oil have no antiseptic properties. Carbolic acid is sometimes administered internally —of course in small doses. It may also be used to relieve toothache. Carbolic acid has the peculiar effect of rendering the urine dark, even though but a small quantity should enter the body by absorption from surgical dressings. Taken internally in somewhat concentrated form carbolic acid acts rapidly as a poison, producing collapse, a cold and clammy skin, feeble respiration, etc. The mouth, throat, œsophagus, and stomach exhibit white eschars, or sloughs. In cases of poisoning, an emetic should be administered, followed by a dilute solution of magnesium or sodium sulphate taken internally; soluble sulphates combine with carbolic acid to form the harmless sulpho-carbolates, such as sodium sulpho-carbolate, $C_6H_4.OH.NaSO_3$. It is also necessary to inject some stimulant, for instance, brandy, subcutaneously Carbolic acid may be readily detected in a substance submitted for analysis by dissolving some of the substance in water and adding a drop of ferric chloride solution: in the presence of carbolic acid a violet color is produced. The following, however, is a much more sensitive test: Phenol combines directly with bromine to form tribrom-phenol bromide, a yellowish-white solid compound; to test a solution for phenol, bromine water may, therefore, be added, when, if mere traces of phenol are present, a flocculent precipitate will form either immediately or on standing for a short time. The bromine reaction is also used for the quantitative determination of phenol. Carbolic acid was discovered in 1834 by Runge, among the products obtained in the distillation of coal-tar. A few years later Laurent succeeded in preparing a pure crystalline carbolic acid which he analyzed and named *phenic acid*, or *phenyl hydrate*, from the Greek φαίνειν —to give light. The commercial product known as *crude carbolic acid* contains, besides phenol, various other substances derived from coal-tar; it has a creosote-like odor, and is composed chiefly of phenol and cresol.

Formerly carbolic acid was much used in surgery for protecting the part operated upon from the air; during operations the air in the neighborhood of the wound was kept antiseptic by a fine spray of a weak carbolic-acid solution. The practice was introduced by Lister, but is at present considered superfluous, and even somewhat dangerous, as it may give rise to poisoning. Carbolic acid is generally used to disinfect surgical instruments, bed-linen, fecal discharges, walls and floors, drains, etc. The cresol contained in crude carbolic acid is itself quite useful for these purposes. Carbolic acid is further used in itching of the skin, as a stimulant to ulcers, as a gargle, for burns, etc. Hypodermically it has been employed in hemorrhoids, erysipelas, synovitis, inflamed bursæ, bubo, poisoned wounds, glandular swellings, etc. Internally it has been used in flatulent dyspepsia (in the form of sulpho-carbolate of soda), in typhoid fever, and in diabetes due to disease of the liver. It has been used hypodermically, by injection into the lung-substance, and as a spray in tuberculosis of the lungs, but without much benefit, although the spray allays cough.

CARBON (Lat. *carbo*, coal). One of the most important chemical elements. It exists in large quantities, both in the free state and in combination with other substances. It occurs uncombined in the mineral graphite, or black lead, and in the diamond, which is pure crystallized carbon. It is much more abundant, however, in a state of combination. United with oxygen, it occurs as carbonic acid in the atmosphere and in natural water, and it is similarly combined in limestone, dolomite, and ironstone. In coal it is found combined with hydrogen and oxygen, and in plants and animals it occurs as one of the elements building up wood, starch, gum, sugar, oil, bone (gelatin), and flesh (fibrin). Indeed, there is no other element which is so characteristic of plant and animal organisms as carbon. Carbon is often set free by the decomposition of organic matter. Thus charcoal forms during the imperfect combustion of wood. Many volatile organic substances, especially those rich in carbon, burn with a smoky flame, soot being nothing but finely divided carbon. The decomposition of vegetable refuse under water gives rise to the formation of peat. The formation of humus (black earth) is due to the carbonization of vegetable matter in moist air. At elevated temperatures carbon combines directly with oxygen, sulphur, silicon, and many metals. (See CARBIDES.) If heated with oxygen or with a strong oxidizing agent like nitric acid, carbon forms carbonic-acid gas; if the amount of available oxygen is, however, small, carbonic oxide is produced, which contains a much lower percentage of oxygen. At ordinary temperatures carbon is, like nitrogen, extremely inert; so much so that it is customary to char the ends of piles of wood which are to be driven into the ground, so as by this coating of non-decaying carbon to preserve the wood. In a similar manner, the interior of wooden vessels intended to hold water during sea voyages is charred (coated with carbon) to keep the wood from passing into decay and thus to preserve the water 'sweet.' Three allotropic modifications of carbon are known—viz., amorphous carbon, graphite, and diamond. The chemical identity of these substances is proved by burning them, equal quantities yielding precisely the same amount of carbonic acid, though there is a marked difference in the readiness with which they burn. Artificial amorphous carbon takes fire readily; graphite is so non-combustible that crucibles made of this material withstand a high heat for a considerable length of time; diamond completely resists most ordinary modes of setting fire to it, but can be burned readily in an atmosphere of pure oxygen, by means of the electric current. The specific gravities, the hardness, and other physical properties of the three allotropic modifications of carbon are likewise very different. Many experiments have been made with the object of transforming the less valuable varieties of carbon into diamond. Only very minute quantities of diamond have hitherto been made artificially. After diamond was found to be accompanied in meteors by iron and sulphur, the distinguished French chemist Charles Friedel endeavored to produce diamond by heating cast iron rich in carbon with sulphur, at 500° C., when a small amount of an exceedingly hard substance was produced; the quantity was, however, so slight that it was impossible to demonstrate conclusively the formation of diamond. Even by the use of the electric furnace, Moissan, in 1893, succeeded in obtaining only traces of diamond. Graphite, on the contrary, is readily formed from charcoal by heating; this is the effect, for instance, of the action of a powerful galvanic current on charcoal. Pure carbon may be prepared by charring organic substances, such as sugar, that leave no ash; to prepare it from lampblack, this substance is carefully washed with alcohol and ether and heated to a high temperature. Lampblack is largely used for making black paint, printers' ink, etc.; it is obtained by burning substances rich in carbon, such as tar, natural gas, etc. Graphite, which occurs in large quantities in nature, is used for the manufacture of pencils, after being powdered and freed from earthy matter. The carbons used in electric lighting are likewise made of graphite, which is obtained in a very dense form by mixing powdered coal with syrup to a pasty mass, giving the latter the desired shape, and applying an intense heat. Charcoal has been utilized for making the carbonic acid used in sugar-works, and for other purposes in the arts; it is employed for decolorizing solutions (see BONE-BLACK); and as, when dry, it readily absorbs gases, it is used as a disinfectant and deodorant. It is also sometimes used in medicine as an antidote against vegetable poisons, such as opium, aconite, etc. Carbon is infusible and insoluble in any known liquid. The atomic weight of the element is 12, and it is denoted in chemical formulas by the symbol C. The molecule of carbon probably constitutes a complex system of atoms. See CHARCOAL; COAL; GRAPHITE; DIAMOND; CARBON COMPOUNDS; VALENCY.

CARBONARI, kär'bô-nä'rê (It., pl. of *carbonaro*, from Lat. *carbonarius*, charcoal-burner, collier, from *carbo*, coal). The name of a secret political society which took an active part in the struggle for Italian liberty and unity. Its existence and character first became in some degree known in 1815. The constitution, as well as the precise objects of the Carbonari, still remains in a great measure secret, though there have been printed instructions, catechisms, statutes, and rituals of the society. Like other secret societies, it sought to dignify itself and rationally account for its existence by claiming a high antiquity, but such accounts are fabulous. There is every reason to believe that it originated during the last French régime in Naples. Botta, in his *Storia d'Italia*, states that under Murat's Government the Neapolitan republicans, hating the French and King Ferdinand equally, escaped into the wild defiles of the Abruzzi, and formed a secret society, naming themselves Carbonari. The peculiar phraseology of the Carbonari is taken from the vocation of charcoal-burners. They were wont, for instance, to speak of "clearing the forest of wolves." The 'wolves' probably meant at first foreign tyrants; but in the course of time the term was applied to the Neapolitan Bourbons. Among themselves the initiated were styled 'good cousins.' The various societies do not seem to have possessed a common centre, or to have been properly organized for combined action. A place of meeting was styled *baracca*, or hut; the external neighborhood 'the forest'; and the interior of the hut was the *vendita* or 'place for selling coal.' A union of several of these 'huts' formed a 'republic.' The superior 'huts' (*alte vendite*) at Naples and Salerno endeavored, but without success, to effect a centralization of the Carbonari. The society, soon after its institution, numbered from 24,000 to 30,000 adherents, and increased so rapidly in Italy, that in March, 1820, it is said as many as 650,000 new members were initiated, including considerable numbers of the military and clergy.

After the restoration of the Bourbons, several secret political unions were formed in France, which in 1820 were confederated with the Carbonari. Paris was made the headquarters of a Carbonarism which, adopting all the symbolic phraseology, rules, and regulations of the Italian societies, received from the systematizing genius of the French an organic character which it had never before possessed. The initiated styled themselves *bons cousins*, and spoke of the uninitiated as *pagani* (heathens). Written documents and communications were strictly prohibited, and treachery was punished by assassination. After the July Revolution, several of the leading French Carbonari attached themselves to the new régime, and their society was gradually dissolved. In its place the new *Charbonnerie démocratique* was founded, having for its object the establishment of a republican government, founded on the principles of Babeuf (q.v.). The endeavors of these new Carbonari to make Paris the centre of all political movements led to the secession of the Italian refugees. Napoleon III. in his young republican days was a member of this society, and Charles Albert (q.v.) of Sardinia was persistently charged with being a Carbonaro. Though the Carbonari did some service in the cause of Italian unity by awakening the feeling of patriotism, it is doubtful if the results they accomplished were in proportion to their pretensions and to the vast resources which they commanded. When members were initiated in such large numbers it was inevitable that the fervor which actuated the original founders of the society should disappear. In the course of time the activity of the Carbonari degenerated into a mere spouting of symbolic catchwords and the celebration of an awe-inspiring ritual. It was as a revolt against namby-pamby patriotism mixed with mummery that Mazzini founded the revolutionary society of Young Italy (q.v.). Consult: *Memoirs of the Secret Societies of the South of Italy, Particularly the Carbonari* (London, 1821); Heckethorn, *The Secret Societies of All Ages and Countries* (New York, 1897); Saint Edme, *Constitution des Carbonari* (Paris, 1821); Cantù, *Il conciliatore e i Carbonari* (Milan, 1878).

CARBONATED or **ACID'ULOUS WATERS.** Natural waters containing a large amount of carbonic acid. While the quantity of the latter in spring and well water rarely exceeds 8 per cent. by volume, its quantity in carbonated waters is usually as great as 30 to 60 per cent. and is often much greater. The spring water at Saint-Nectaire in Puy de Dôme, France, is said to contain in every 100 volumes as much as 400 volumes of carbonic acid. The carbonic acid exists in such waters in the free state, but is generally accompanied by either sodium bicarbonate or iron carbonate. Waters containing sodium bicarbonate are known as *carbonated alkaline* or *acidulous alkaline;* such are the famous German mineral springs at Altwasser, Pyrmont, Reinerz, Salzbrunn, and Seltzer, as well as the Navajo and Ute Springs, Manitou, Colo., the Napa Soda Springs, California, and the Hot Springs, Virginia, in the United States. Waters containing iron carbonate are called *carbonated chalybeate*, or *acidulous chalybeate;* such are the waters of the spring at Irkeston, near Nottingham, in England, as well as the Iron Ute Spring of Manitou, Colo., and the Rawley Springs of Virginia, in the United States. Carbonated waters are very refreshing and exhilarating, and may be useful in certain disordered conditions of the stomach; they relieve nausea, and generally increase the discharge of liquid from the system. See AËRATED WATERS; CHALYBEATE WATERS; and MINERAL WATERS.

CARBONATES. See CARBONIC-ACID GAS.

CARBON COMPOUNDS, or ORGANIC COMPOUNDS. A very large number of chemical substances that form the subject of the science of *Organic Chemistry*. The reason for terming the compounds of carbon 'organic compounds,' is that many of them could originally be obtained only from the bodies of animals and plants. For the same reason, their formation was for a long time supposed to require the agency of life. Since 1845, however, every year has seen the artificial production of a host of carbon compounds; and not only have most of the natural animal and vegetable substances been reproduced artificially, but thousands of compounds have been prepared that are not known to exist ready-formed anywhere in nature. It is mainly on account of their large number that the chemistry of these compounds is treated as a branch distinct from the chemistry of the other elements. There is, however, another reason for this division of the science. Most of the compounds of carbon contain, besides carbon itself, only two or three other elements (hydrogen, oxygen, nitrogen), and those in relative quantities often the same, or very nearly the same, in different compounds. The cause of the great variety found among the carbon compounds is mainly in the great variety of ways in which the few elements are capable of combining with carbon. The theories of the constitution of carbon compounds are therefore somewhat complex, and for this reason 'organic' chemistry is kept separated from and taught after 'inorganic' chemistry.

Isolation of Compounds. The presence of one or more carbon compounds in a given substance may usually be detected by taking advantage of the fact that, on being heated, carbon compounds are charred, i.e. decomposed with separation of free carbon, which is readily recognized by its black color. The next step in the examination of a given substance is to determine whether it consists of one single compound, or of a mixture of two or more compounds. This is usually accomplished by subjecting the substance to some physical process, such as distillation or crystallization, by means of which the substance may be separated into two or more portions; if these portions are found to be identical in their physical and chemical properties, the conclusion is drawn that the substance consists of a single compound. (See Chemistry.) In most cases distillation alone is capable of effecting the complete separation of compounds, and the same may be said of the crystallization of solid substances from their solutions—another process frequently employed by chemists for isolating and purifying compounds of carbon. Crystallization is, as a rule, more effective as a process of purification than distillation, and hence chemists are anxious, whenever possible, to obtain their compounds in a solid crystalline form.

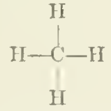
Analysis. After a compound has been isolated and purified by repeated distillation or crystallization, its physical properties (especially the boiling or melting point) are carefully determined, and then it is analyzed. The analysis of carbon compounds usually involves the determination of carbon and hydrogen, and often of nitrogen. Carbon and hydrogen are determined simultaneously by heating a known amount of the compound in a glass tube with copper oxide, which oxidizes all the hydrogen into water vapor and all the carbon into carbonic acid. The process is for evident reasons termed a *combustion*. The products of the combustion are collected, respectively, in sulphuric acid and in caustic potash, and their weights are carefully determined, the percentages of hydrogen and of carbon in the given compound being calculated from those weights. A second combustion is required to determine the amount of nitrogen that may be present in the compound. The combustion yields the nitrogen in the free state, the gas being collected in a graduated tube which shows the volume produced, and from this the percentage, by weight, of nitrogen in the given compound is found by a simple calculation. A direct determination of oxygen is unnecessary; after the percentages of carbon, hydrogen, and nitrogen have been determined, that of oxygen becomes evident. In the case of organic compounds of silver the amount of the latter may often be determined by simply heating a known quantity of the compound in a crucible; the metal then remains behind as such, and is weighed directly, while the rest of the compound burns away. The amount of sodium or potassium in an organic compound may be determined by heating a known quantity of the latter with strong sulphuric acid, pure sodium or potassium sulphate being thus produced, and from the weight of this the percentage of metal in the compound is readily calculated. The halogens (chlorine, bromine, and iodine) are best determined in organic compounds by heating these in sealed glass tubes with fuming nitric acid and silver nitrate, the product being a halogen compound of silver, from the weight of which the percentage of hydrogen in the given organic compound is found by a simple calculation. The determination of sulphur, phosphorus, and other elements that may sometimes be present in carbon compounds need not be described here, the purpose of the present sketch being merely to convey a general idea of the ways in which it is possible to ascertain the composition of organic substances, and not to give detailed specific information; such information should be sought in special works on chemical analysis.

Molecular Formulas. After analysis has shown the percentage composition of a substance, the next step is to determine its molecular formula. For this purpose the percentages of the constituent elements must, first of all, be expressed in terms of their atomic weights. Let, for example, an analysis of pure acetic acid give the following results: carbon, 39.9 per cent.; hydrogen, 6.7 per cent.; and oxygen, 53.4 per cent. Since the atomic weights of the three elements are, respectively, 12, 1, and 16, the analytical results 39.9 ÷ 6.7 ÷ 53.4 are written in the form (3.33 × 12) ÷ (6.7 × 1) ÷ (3.34 × 16), or, using the symbols of the elements to denote their atomic weights, in the form, 3.33C ÷ 6.7H ÷ 3.34O. Allowing for the errors of analysis, it is therefore evident that for every atom of carbon, acetic acid contains 2 atoms of hydrogen and 1 atom of oxygen—a relation expressed by any one of the formulas, CH_2O, $C_2H_4O_2$, $C_3H_6O_3$, etc. According to the first of these formulas, the molecular weight of acetic acid would be 30 (i.e. 12 × 1 + 1 × 2 + 16 × 1); according to the second it would be 60 (i.e. 12 × 2 + 1 × 4 + 16 × 2); according to the third it would be 90, etc. Now, according to Avogadro's rule, the molecular weight of a compound is twice as great as the density of its vapor (compared with hydrogen). Therefore, in order to fix the molecular weight of acetic acid, its vapor-density must be determined; and this may be done by one of the methods described in the article Molecules—Molecular Weights. The vapor-density being found to be about 30, the molecular weight is taken to be 60, and hence the formula $C_2H_4O_2$ is accepted as representing a molecule of acetic acid.

Chemical Constitution. The molecular formula of a compound represents its composition and its smallest relative reacting-weight. It is not, however, altogether characteristic of the compound, for numerous cases are known in which a number of different compounds are represented by one and the same molecular formula. Thus, both ordinary alcohol and di-methyl ether (a substance that may be obtained from wood-alcohol) are represented by the formula C_2H_6O; five compounds, viz. ordinary ether and the four different substances called butyl-alcohols, are found to have in common the formula $C_4H_{10}O$, etc. Such compounds are said to be *isomeric*, or more strictly, *metameric*, the term isomeric being often extended to include also the so-called *polymeric* compounds, i.e. those which have the same relative composition but not the same molecular weight, such as acetylene, C_2H_2, and benzene, C_6H_6. (Another kind of isomerism may be found discussed in the article STEREO-CHEMISTRY.)

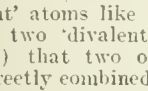
The isomerism of carbon compounds shows plainly that the composition of a substance does not entirely determine its chemical individuality. For two or more molecules composed of the same kind and number of atoms may represent very different compounds. It is therefore evident that the character of a compound must depend to a great extent also upon the manner in which the atoms are held in combination within its molecule. This, at least, is the only possible explanation that presents itself to the mind, assuming that substances are really made up of atoms and molecules: and without this assumption, i.e. without the atomic hypothesis, isomerism could not be explained at all. After, therefore, the composition and molecular weight of a newly isolated compound have been determined, a further and much more difficult problem remains to be solved; viz. to determine the *chemical constitution* of the compound, i.e. the manner in which the atoms are arranged in its molecules. This problem is solved by combining the results of a careful study of the chemical and physical properties of the compound with a theoretical assumption first induced independently by Kekulé and Couper. The following paragraphs may convey an idea as to how this is done.

GRAPHICAL FORMULAS. The theoretical assumption just referred to is (1) that an atom of carbon is quadrivalent, i.e. has four times the combining capacity of an atom of hydrogen, and, therefore, can hold in combination four 'univalent' atoms like those of hydrogen and chlorine, or two 'divalent' atoms like those of oxygen; (2) that two or more carbon atoms may be directly combined with one another and may thus partly satisfy one another's combining capacity. This assumption, together with a knowledge of the valencies (combining capacities) of other elements, makes it easy to determine *a priori* the several different combinations that are possible with a given set of atoms, each arrangement being represented by a scheme, called a graphical formula, in which the atoms are represented by the chemical symbols of the elements, and their combining capacities by dashes that link together the symbols. The set of atoms CH_4 can be represented, on the above assumption, by only one graphical formula, viz.



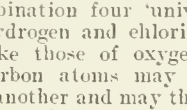
$$\begin{array}{ccc} & \mathrm{H} & \\ & | & \\ \mathrm{H}- & \mathrm{C} & -\mathrm{H} \\ & | & \\ & \mathrm{H} & \end{array}$$

The sets C_2H_6 and C_3H_8 can likewise be represented each by only one graphical formula, viz.



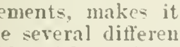
$$\begin{array}{cccc} & \mathrm{H} & \mathrm{H} & \\ & | & | & \\ \mathrm{H}- & \mathrm{C}- & \mathrm{C} & -\mathrm{H} \\ & | & | & \\ & \mathrm{H} & \mathrm{H} & \end{array}$$

and



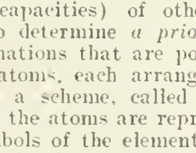
$$\begin{array}{ccccc} & \mathrm{H} & \mathrm{H} & \mathrm{H} & \\ & | & | & | & \\ \mathrm{H}- & \mathrm{C}- & \mathrm{C}- & \mathrm{C} & -\mathrm{H} \\ & | & | & | & \\ & \mathrm{H} & \mathrm{H} & \mathrm{H} & \end{array}$$

The set C_4H_{10} can be represented by two different graphical formulas, viz.



$$\begin{array}{cccccc} & \mathrm{H} & \mathrm{H} & \mathrm{H} & \mathrm{H} & \\ & | & | & | & | & \\ \mathrm{H}- & \mathrm{C}- & \mathrm{C}- & \mathrm{C}- & \mathrm{C} & -\mathrm{H} \\ & | & | & | & | & \\ & \mathrm{H} & \mathrm{H} & \mathrm{H} & \mathrm{H} & \end{array}$$

and



$$\begin{array}{ccccccc} & & \mathrm{H} & \mathrm{H} & \mathrm{H} & & \\ & & | & | & | & & \\ & \mathrm{H}- & \mathrm{C}- & \mathrm{C}- & \mathrm{C} & -\mathrm{H} & \\ & & | & | & | & & \\ & & \mathrm{H} & | & \mathrm{H} & & \\ & & \mathrm{H}- & \mathrm{C} & -\mathrm{H} & & \\ & & & | & & & \\ & & & \mathrm{H} & & & \end{array}$$

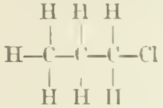
Similarly, the set C_5H_{12} can be represented by *three* different graphical formulas; the set C_6H_{14} by *five* formulas, etc.

When a compound is discovered whose molecular formula can be represented by only one such graphical scheme, the case is simple, and the structure of the molecule becomes known at once. Further, in such cases the inference from the theory is that only one compound of the given molecular formula is capable of existence. In this manner, for instance, the theory gives us the constitution of marsh-gas, CH_4, of ethane, C_2H_6 (a constituent of coal-gas), of propane, C_3H_8, etc.; the verdict of the theory being, further, that only one compound CH_4, only one compound C_2H_6, and only one compound C_3H_8, are capable of existing. The fact that the most careful researches have actually led chemists to the discovery of one, and only one, compound corresponding to each of these molecular formulas, speaks strongly in favor of the structural theory. Again, in cases in which more than one graphical formula can be constructed from a given set of atoms, the number of compounds actually known is generally the same as the number of formulas. Thus, we have seen that two different structural formulas correspond to the molecular formula C_4H_{10}; and, as a matter of fact, two, and only two, compounds of the formula C_4H_{10} can be obtained, viz. the substances known, respectively, as butane and isobutane, which have the same composition and the same molecular weight, yet differ considerably in their physical and chemical properties. Similarly, three different compounds of the formula C_5H_{12} are known, five different compounds of the formula C_6H_{14}, etc. In cases in which the number of isomeric compounds actually known was less than the number indicated as possible by the structural theory, earnest research has finally led to the discovery of the wanting isomerides.

The correspondence between the chemical properties of a compound and the relations exhibited by its graphical formula is usually capable of experimental demonstration. In the case of marsh-gas the graphical formula is symmetrical, because the doctrine of valency assumes no difference between the several valencies of an atom. We may, accordingly, expect that the four portions of hydrogen contained in the compound exercise precisely the same function and are in all respects identical. If there were two different positions in the graphical formula, which we will call positions A and B, then we could obtain, for example, one derivative by substituting chlorine for hydrogen in position A while leaving hydrogen in position B: and we could obtain a different derivative by substituting chlorine in position B while leaving hydrogen in A. In other words, two different mono-chloro-substitution products of marsh-gas would be possible. But the mono-chloro-substitution product has been obtained by many different methods, and the product was always found the same. All efforts to produce two different derivations have failed. The conclusion is that the several portions of hydrogen contained in marsh-gas have really the same function.

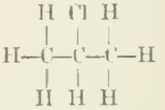
When we examine the graphical formula of ethane, C_2H_6 (see above), we find again that the several positions of the hydrogen atoms are identical: each hydrogen atom is, namely, attached to a carbon atom to which two more hydrogens and one CH_3 group are linked at the same time. If we should substitute chlorine in the place of one of the hydrogen atoms, we would —the formula tells us—obtain the same derivative, no matter which particular portion of the hydrogen is displaced. In this case, too, different and ingenious methods have actually been employed by chemists, with a view to displacing different portions of the hydrogen by chlorine and thus possibly producing two different mono-chloro-substitution products. Yet one, and only one such product could be obtained.

Applying the same method to the graphical formula of propane, C_3H_8 (see above), we find that there are two different hydrogen-positions in it; so that two other formulas can be derived from it by substituting a chlorine atom in place of one hydrogen atom, viz.



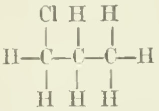
$$\begin{array}{ccccccccc} & & H & & H & & H & & \\ & & | & & | & & | & & \\ H & - & C & - & C & - & C & - & Cl \\ & & | & & | & & | & & \\ & & H & & H & & H & & \end{array}$$

and



$$\begin{array}{ccccccccc} & & H & & Cl & & H & & \\ & & | & & | & & | & & \\ H & - & C & - & C & - & C & - & H \\ & & | & & | & & | & & \\ & & H & & H & & H & & \end{array}$$

The difference between the two formulas, expressed in words, is as follows: in the first formula the chlorine is linked to a carbon atom to which two hydrogens and one C_2H_5 group are linked at the same time; in the second formula the chlorine is linked to a carbon atom to which one hydrogen atom and two CH_3 groups are linked at the same time. These are the only possible cases. If we consider a formula like the following;

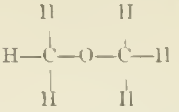


$$\begin{array}{ccccccccc} & & Cl & & H & & H & & \\ & & | & & | & & | & & \\ H & - & C & - & C & - & C & - & H \\ & & | & & | & & | & & \\ & & H & & H & & H & & \end{array}$$

which may seem, at first sight, to differ from either of the above two formulas, we have no difficulty in observing that it is characterized precisely as the first of those formulas: viz. its chlorine is linked to a carbon to which two hydrogens and one C_2H_5 group are linked at the same time. In general, a graphic formula is not meant to convey an image of the configuration of the atoms within a molecule; all it is expected to show is what atoms and groups of atoms exist in the molecule and how they are combined with one another. If we now turn to the facts of experimental chemistry, we find again that chemists have really been able to prepare two, and only two mono-chloro-propanes having in common the molecular formula C_3H_7Cl, yet differing considerably in their properties.

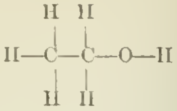
The number of examples thus showing the perfect correspondence between theoretical formulas and the results of experimental investigation might be multiplied almost indefinitely. A further question, however, remains to be answered: supposing two or more graphical formulas correspond to the same molecular formula, and the several thus possible compounds have actually been prepared—how do we know which formula corresponds to which compound?

This question is usually answered by a study of the reactions and methods of preparing the compounds. The two substances di-methyl ether and ordinary alcohol may serve as an example. Both have the same molecular formula, C_2H_6O. On the other hand, the set of atoms making up this molecule may be represented by two different graphical formulas, viz.



$$\begin{array}{ccccccccc} & & H & & & & H & & \\ & & | & & & & | & & \\ H & - & C & - & O & - & C & - & H \\ & & | & & & & | & & \\ & & H & & & & H & & \end{array}$$

and



$$\begin{array}{ccccccccc} & & H & & H & & & & \\ & & | & & | & & & & \\ H & - & C & - & C & - & O & - & H \\ & & | & & | & & & & \\ & & H & & H & & & & \end{array}$$

Now, an experimental investigation of the alcohol reveals the following facts:

(1) By the action of metallic sodium alcohol is transformed into a compound represented by the formula C_2H_5NaO. The molecular formula of the alcohol being C_2H_6O, it is evident that in this transformation one-sixth of the hydrogen contained in the alcohol is replaced by sodium. No matter how great an excess of sodium is used, no more than one-sixth of the hydrogen can thus be replaced. The transformation therefore speaks in favor of assigning to alcohol the second of the above graphical formulas, because the first shows no difference whatever in the relative positions of the several hydrogen atoms, and only the second formula shows one hydrogen atom in a different position from the other five hydrogens.

(2) By the action of phosphorus penta-chloride one-sixth of the hydrogen, together with all the oxygen contained in the alcohol, is replaced by chlorine, according to the following equation:

$$\underset{\text{Ethyl alcohol}}{C_2H_6O} + PCl_5 = \underset{\text{Mono-chloro-ethane}}{C_2H_5Cl} + POCl_3 + HCl$$

This transformation, too, speaks in favor of assigning to the alcohol the second of the above graphical formulas, for it shows that one-sixth of the hydrogen is so intimately associated with the oxygen that they readily leave the compound together. And as, further, metallic sodium refuses to combine with the mono-chloro-ethane produced by the transformation, we conclude that the portion of the hydrogen of alcohol which is replaceable by sodium must be the same as the portion which we have just seen to be intimately associated with oxygen. That portion is evidently represented in the graphical formula by the hydrogen atom of the 'hydroxyl' group O—H.

Since, besides the two transformations just considered, all other reactions of ordinary alcohol bring out the perfect correspondence between the chemical properties of this substance and the relations exhibited by the second graphical formula, there remains no doubt as to which of the two formulas should be assigned to alcohol. But then the first formula remains the only possible one for our ether. The correspondence between the ether and the graphical formula thus chosen to represent it, is, just as in the case of the alcohol, brought out by a number of reactions, but these cannot be discussed here. Suffice it to mention that the ether reacts neither with metallic sodium nor with phosphorus penta-chloride; which indicates that the ether does not, like the alcohol, contain a hydroxyl group O—H. The graphical formula shows the same thing very plainly.

RADICLES. The example considered in the preceding paragraphs has led us, among other things, to the conclusion that a molecule of ordinary alcohol contains a 'hydroxyl group OH.' The conclusion was based on the fact that a portion of the hydrogen of alcohol and the whole of its oxygen were seen to leave the compound together, while the rest of the molecule remained unchanged. The molecule of alcohol, C_2H_6O, is accordingly conceived as consisting of two atomic groups, C_2H_5 and OH, the constituent atoms of which tend to hold firmly together, although, of course, they are not altogether incapable of being separated. Such atomic groups, behaving during many transformations of the compound as if they were just single atoms, are called *radicles.*

An example may serve to show how the smallest radicles present in a given compound are determined by its chemical reactions. Let the problem be, To determine the atomic groups in a molecule of acetic acid, $C_2H_4O_2$. To solve the problem, acetic acid is caused to undergo a series of transformations and the following facts are brought to light.

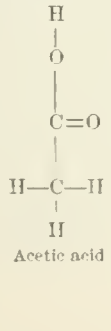
(1) By the action of phosphorus penta-chloride, acetic acid, $C_2H_4O_2$, is readily transformed into acetyl chloride, whose formula is C_2H_3OCl. In this reaction an atom of hydrogen and an atom of oxygen are together replaced by an atom of chlorine. We therefore conclude that acetic acid, like alcohol, contains a hydroxyl group, OH.

(2) By passing chlorine gas into hot acetic acid exposed to the direct action of sunlight, a compound called tri-chloro-acetic acid is obtained. When boiled with water, this compound is split up and chloroform is produced. Chloroform has the formula CCl_3H and hence evidently contains the group CCl_3. The formation, by a simple reaction, of a compound containing the group CCl_3, out of tri-chloro-acetic acid, indicates that this acid itself must contain the group CCl_3—a view fully confirmed by other reactions. And since the molecule of tri-chloro-acetic acid, $C_2HCl_3O_2$, contains three chlorine atoms altogether, it is evident that tri-chloro-acetic acid contains no chlorine but what is combined in its CCl_3 group.

(3) When tri-chloro-acetic acid is treated with nascent hydrogen, all of its chlorine is replaced by hydrogen, and acetic acid is re-obtained. Since tri-chloro-acetic acid was just shown to contain no chlorine outside its CCl_3 group, it is evident that the substitution of hydrogen for chlorine must result in the formation of the group CH_3. The resulting compound, i.e. acetic acid, must therefore contain a methyl group CH_3.

(4) From the above it is clear that acetic acid contains the radicles OH and CH_3. Subtraction of these from the entire molecule, $C_2H_4O_2$, leaves the group CO, which is evidently the third and last group contained in acetic acid.

We may, therefore, assign to acetic acid the *rational*, or constitutional, formula $CH_3CO.OH$. And, remembering that according to the structural hypothesis a carbon atom is quadrivalent, and two or more carbon atoms can be linked to each other in a molecule, we can, further, combine the three radicles of acetic acid into the following graphical formula:



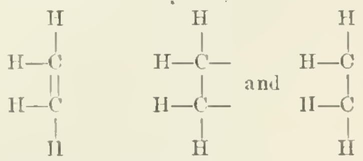
$$\begin{array}{c} H\\ |\\ O\\ |\\ C{=}O\\ |\\ H{-}C{-}H\\ |\\ H\end{array}$$

Acetic acid

It is easy to see that although this is not the only possible graphical formula corresponding theoretically to the molecular formula of acetic acid, $C_2H_4O_2$, a knowledge of the radicles, derived by experimental investigation, eliminates the other possibilities and leaves no doubt as to what graphical formula must be accepted as representing the arrangement of the atoms within a molecule of acetic acid. Numerous facts might be cited in further support of this formula. For example, in the formula three hydrogens are seen to be linked to carbon immediately, while the fourth hydrogen is linked to carbon through oxygen. The formula thus teaches that one of the four hydrogen atoms must have a different function from the other three hydrogens. But this is also the verdict of experiment. In fact, when acetic acid combines with alkalies to form the corresponding acetates, it is found that no matter how great the excess of alkali employed, one-quarter, and only one-quarter, of the hydrogen of acetic acid can be replaced by metal, which shows that the replaceable quarter of the hydrogen has a different function from the other three-quarters. In analogous ways, a correct graphical formula, constructed from a given set of facts with the aid of the structural hypothesis, is always found to agree with any other fact dependent on the nature of the compound, and this agreement permits the trained chemist to foretell what the principal chemical properties of a compound must be, by examining its graphical formula.

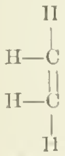
UNSATURATED COMPOUNDS. Thus far we have referred only to compounds in which the valencies of the several atoms are completely satisfied, so that the molecules are incapable of taking on any more atoms. Thus, in marsh-gas, CH_4, the four valencies of the carbon atom are evidently satisfied by four atoms of hydrogen. In ethane, C_2H_6, three valencies of each carbon atom are evidently satisfied by hydrogen atoms, while the fourth valency of each carbon atom is satisfied by the other carbon atom. Compounds thus containing the maximum possible number of atoms of hydrogen, or of other elements, are said to be *saturated.* Many other compounds, however, are known, in which this is not the case. Thus, while ethane, C_2H_6, contains six hydrogen atoms, the gaseous compound known as ethylene contains only four hydrogen atoms in combination with two atoms of carbon, the formula of ethylene being C_2H_4.

Three different graphical formulas might represent a molecule of ethylene; viz.



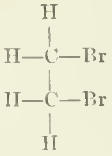
$$\begin{array}{ccccc} H & & H & & H\\ | & & | & & |\\ H{-}C & & H{-}C{-} & & H{-}C\\ \| & & | & \text{and} & |\\ H{-}C & & H{-}C{-} & & H{-}C\\ | & & | & & |\\ H & & H & & H \end{array}$$

According to the first, two valencies of each carbon atom are satisfied by the other carbon atom. According to the second, one valency of each carbon atom remains unsatisfied. According to the third, the carbon atom is not quadrivalent, but tri-valent. Now, the last two formulas must be rejected in view of the following fact: A great deal of ingenuity has been spent, by some of the most celebrated organic chemists, in efforts to produce a compound of molecular formula CH_3 and similar compounds, the existence of which would prove, either that one of the valencies of a carbon atom may remain unsatisfied, or that carbon may occur in the tri-valent state; but all such efforts have invariably failed. The view corresponding to the first of the above graphical formulas has therefore been universally adopted, viz., that in ethylene, and in similar compounds, carbon atoms satisfy two of each other's valencies. This view is further strongly supported by the facts of what is now termed 'geometrical isomerism,' a discussion of which may be found under STEREO-CHEMISTRY. The formula of ethylene suggests that the molecule of this compound would not be broken up if one of the two bonds between the atoms of carbon were dissolved, and two univalent atoms of some element were linked on by the two carbon affinities thus set free. As a matter of fact, ethylene combines directly with bromine and certain other elements, forming what is termed 'additive compounds,' the term suggesting that the atoms—say, of bromine—join the molecule of ethylene without displacing anything in it. Ethylene and its additive compound with bromine are represented, respectively, by the following two formulas:



$$\begin{array}{rl} & \text{H} \\ & | \\ \text{H—} & \text{C} \\ & \| \\ \text{H—} & \text{C} \\ & | \\ & \text{H} \end{array}$$

Ethylene



$$\begin{array}{rcl} & \text{H} & \\ & | & \\ \text{H—} & \text{C} & \text{—Br} \\ & | & \\ \text{H—} & \text{C} & \text{—Br} \\ & | & \\ & \text{H} & \end{array}$$

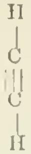
Ethylene di-bromide

In cases like that of ethylene, the correspondence between theory and experiments is again perfect. Whenever, namely, the formula of a compound is found, by the structural hypothesis, to contain a double bond between two carbon atoms, the compound represented by the formula is invariably found to be capable of forming additive products. Compounds like ethylene are, for obvious reasons, termed *unsaturated compounds*. In view of the perfect correspondence between theory and fact, such compounds may be defined either theoretically or empirically, as follows: (1) Unsaturated compounds are compounds in whose molecules there is at least one pair of carbon atoms linked by a double bond; or else, (2) unsaturated compounds are compounds capable of forming additive products with bromine or other elements, i.e. capable of uniting with bromine without at the same time losing any of their own constituents.

The term *doubly unsaturated compounds* is often applied to acetylene and its derivatives, whose formulas are found to contain carbon atoms linked to each other by a triple bond, while the compounds themselves are found capable of taking on twice as much bromine as the corresponding quantities of compounds like ethylene. Further, in doubly unsaturated compounds this formation of additive products with bromine or other elements is found to take place in two steps, as is shown, in the case of acetylene, by the following chemical equations:

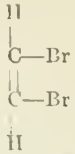
I	C_2H_2 Acetylene	+	Br_2 Bromine	=	$C_2H_2Br_2$ Acetylene di-bromide
II	$C_2H_2Br_2$ Acetylene di-bromide	+	Br_2 Bromine	=	$C_2H_2Br_4$ Acetylene tetra-bromide

The following graphical formulas exhibit clearly the relation between the molecules of acetylene and of its additive products with bromine:



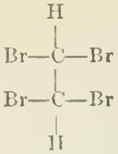
$$\begin{array}{c} \text{H} \\ | \\ \text{C} \\ ||| \\ \text{C} \\ | \\ \text{H} \end{array}$$

Acetylene



$$\begin{array}{cl} \text{H} & \\ | & \\ \text{C} & \text{—Br} \\ \| & \\ \text{C} & \text{—Br} \\ | & \\ \text{H} & \end{array}$$

Acetylene di-bromide

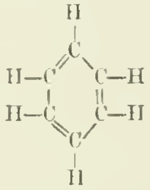


$$\begin{array}{rcl} & \text{H} & \\ & | & \\ \text{Br—} & \text{C} & \text{—Br} \\ & | & \\ \text{Br—} & \text{C} & \text{—Br} \\ & | & \\ & \text{H} & \end{array}$$

Acetylene tetra-bromide

An important property of acetylene and many of its derivatives is their capacity for forming certain metallic compounds (see ACETYLENE). By this property many doubly unsaturated compounds may be readily distinguished from the unsaturated compounds of the ethylene series.

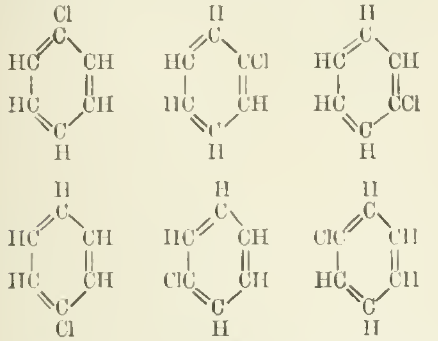
BENZENE AND ITS DERIVATIVES. One of the most important of the compounds of carbon is benzene (q.v.), a liquid hydrocarbon found in coal-tar. Thousands of substances are derived from benzene, thousands find extensive application in the arts. (See COAL-TAR COLORS.) An exact knowledge of the constitution of benzene is therefore highly desirable for theoretical as well as for immediate practical reasons, and so chemists have now for many years diligently searched for a graphical formula that might be in perfect correspondence with all the chemical properties of benzene. A perfect formula has not as yet been devised. Nevertheless, four different formulas, each of which exhibits well *some* of the properties of benzene, have been proposed and are commonly referred to, respectively, as 'Kekulé's formula,' 'the prism formula,' 'the diagonal formula,' and 'the centric formula.' The last of these is now supposed to be the best, but the first is still commonly used by chemists and therefore requires explanation in the present sketch. It is as follows:



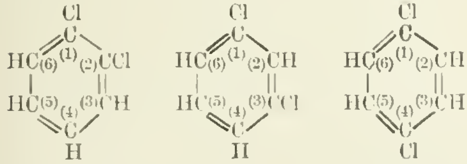
Kekulé's formula for benzene

Unlike the formulas already considered in this article, the formula of benzene has its carbon atoms arranged, not in the form of a chain, but in a ring, with alternating single and double bonds between the atoms. The complete demonstration of this formula formed one of the most beautiful chapters of organic chemistry. Nothing astonishes the young student more than to find that in this demonstration an atom of bromine, substituted for one of the hydrogen atoms of benzene, is made to travel round the molecule, exchanging places successively with each of the hydrogen atoms, and that this migration of the bromine atom is demonstrated beyond the slightest possibility of doubt. The demonstration cannot be repeated here, and an account of it must be sought for in one of the larger works on organic chemistry (or consult Marckwald's lecture on the theory of benzene published in Ahrens's *Sammlung chemischer und chemisch-technischer Vorträge*, Stuttgart, 1897). What requires explanation in the present article is the isomerism of derivatives of benzene and the choice of the particular formula corresponding to each of a given set of isomeric compounds.

Kekulé's formula is based principally on two facts: (1) When one hydrogen atom of benzene is replaced by one atom of some other element, only one product is obtained; thus, only one mono-chloro-benzene, C_6H_5Cl, can be prepared. (2) When two hydrogen atoms of benzene are replaced by two atoms of some other element, three different products may be obtained; thus, three different di-chloro-benzenes, $C_6H_4Cl_2$, can be prepared. Corresponding to the first of these facts, the six hydrogen atoms occupy identical positions in Kekulé's formula, so that only one formula can be obtained by substituting, say, a chlorine atom for a hydrogen atom; for the following formulas are evidently identical:

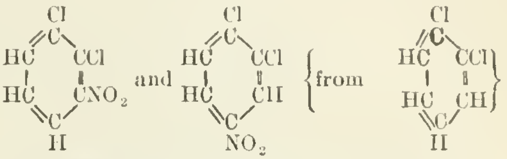


The second of the facts just mentioned may be found to be expressed by Kekulé's formula, by examining all the imaginable arrangements that could be made in the formula by substituting two atoms, say, of chlorine for two of its hydrogen atoms. It is thus easy to find that only three different formulas can be constructed, as follows:

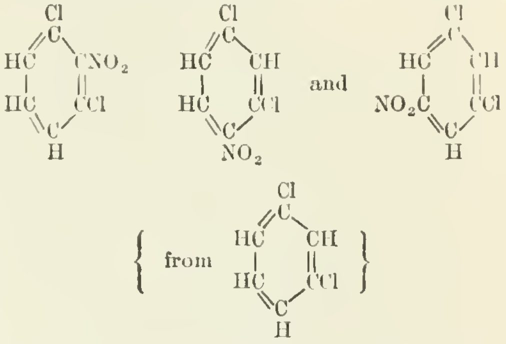


The position (1, 2) of the chlorine atoms in the first of these formulas is called the ortho-position; the position (1, 3) in the second formula is called the meta-position; the position (1, 4) of the third formula is called the para-position. Any other imaginable position would really be identical with one of these three; thus the position (2, 3) is obviously the same as the position (1, 2); the position (1, 5) is the same as the position (1, 3), etc. The three compounds corresponding to our three formulas are called, respectively, ortho-dichloro-benzene, meta-dichloro-benzene, and para-dichloro-benzene, and may be denoted as follows: o-$C_6H_4Cl_2$, m-$C_6H_4Cl_2$, and p-$C_6H_4Cl_2$; or as follows: $C_6H_4Cl_2$ (1, 2), $C_6H_4Cl_2$ (1, 3), and $C_6H_4Cl_2$ (1, 4).

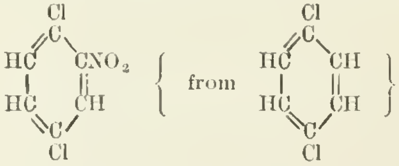
But then how do we know which of these compounds is *ortho*, which is *meta*, and which is *para?* In other words, being given three different compounds and three different formulas corresponding to them, how do we decide which formula is to be assigned to which compound? Several different methods are employed in deciding this important question — important because it presents itself in the case of thousands of valuable compounds. One of these methods, characterized by great simplicity, certainty, and elegance, was discovered by Körner. It is based on the following considerations. When an *ortho*-di-substitution product like ortho-dichloro-benzene is transformed into a tri-substitution product by the introduction of some group, say, the nitro-group NO_2, *two*, and only two, different compounds may be obtained according to the formula of benzene, viz.:



A *meta*-di-substitution product would similarly yield *three*, and only three, tri-substitution products, as follows:



Finally, a *para*-di-substitution product would yield *one*, and only one, tri-substitution product, viz.:



In order, therefore, to determine whether a given di-substitution product is *ortho*, *meta*, or *para*, the given compound may be transformed into a tri-substitution product. If it is then found that the tri-substitution product is capable of existing in two isomeric modifications, the conclusion is that the particular di-substitution product from which it is derived corresponds to the *ortho*-formula. Similarly, if the number of isomeric tri-substitution products is three, the corresponding di-substitution product is seen to be necessarily a *meta*-compound. And if only one tri-substitution product can possibly be obtained from a given di-substitution product, the latter is concluded to be a *para*-compound.

ORGANIC REACTIONS. Now, in reality it would be a tremendous undertaking to go through a demonstration of the kind just described, in the case of every newly discovered compound. In many cases years would have to be spent in determining the constitution of a single compound. Chemists therefore make use of an additional working principle — a generalization made from the study of a large number of organic reactions. According to this, when one compound is transformed into another by some simple reaction, the molecule — at least the principal part of it — remains unchanged. Once, therefore, the constitution of a certain number of substances has been determined, say, by Körner's method, the constitution of any new substance derived from one of them by a simple reaction becomes evident by the very fact that it is derived from a substance of known constitution, or by the fact that it may be transformed into a substance of known constitution; and it is in this manner that the constitution of a great majority of carbon compounds has been brought to light. Thus, if the di-chloro-benzene, $C_6H_4Cl_2$, which is shown by Körner's method to be an *ortho*-compound, were transformed into dioxybenzene, $C_6H_4(OH)_2$, the latter, too, would be assumed to be an *ortho*-compound. It is easy to see that this principle is at the basis of Körner's method itself, and it may be considered as one of the fundamental principles of organic research.

Classification of Carbon Compounds. The innumerable compounds that are said to be derived from benzene all resemble the latter in certain chemical properties—a fact which is in accordance with their formulas having in common the benzene ring, or 'benzene nucleus,' consisting of six carbon atoms. It is therefore convenient to treat the benzene derivatives, otherwise called 'aromatic compounds,' separately from the rest of the compounds of carbon; and hence the division of organic compounds into *fatty* (or aliphatic) and *aromatic*. Just as the aromatic compounds may be considered as derivatives of benzene, the fatty compounds may be considered as derivatives of methane, or marsh-gas, the simplest of the compounds of carbon; and while the aromatic compounds are characterized by having, in their formulas, a nucleus of carbon atoms arranged in a ring, or *closed* chain, the fatty compounds have graphical formulas in which the carbon atoms are arranged along straight lines, or *open* chains. However, in spite of this constitutional distinction between fatty and aromatic compounds, it must be remembered that the compounds of the two classes are more or less closely related, and that compounds of one of these classes may, by suitable methods, be transformed into compounds of the other class. A classical example of such a transformation is Berthelot's celebrated synthesis of benzene itself from acetylene, effected by simply passing the latter through red-hot tubes. Again, the subdivisions of the two great classes present a notable parallelism. Thus, corresponding to the *fatty* acids, alcohols, aldehydes, ketones, etc., there are also *aromatic* acids, alcohols, aldehydes, ketones, etc.

Just as the division of organic compounds into fatty and aromatic is based on a difference in their chemical constitution, so is the further classification of the compounds belonging to each of the two great classes based on constitutional similarities and dissimilarities.

The most important classes of carbon compounds, as well as a large number of individual compounds that are interesting because of the important rôle that they play in the bodies of animals and plants, or because of their useful applications in medicine and the arts, are described under their special names. See Hydrocarbons; Alcohols; Ethers; Aldehydes; Ketones; Acids; Esters; Amides; Amines; Organo-Metallic Compounds; Carbohydrates; Phenols; Diazo-Compounds; etc. Besides the derivatives of methane and of benzene, the derivatives of naphthalene, anthracene, pyridine, and quinoline (qq.v.) deserve mention here. For history and bibliography of organic chemistry, see Chemistry.

CAR'BONDALE. A city in Jackson County, Ill., 92 miles southeast of Saint Louis, Mo., on the Illinois Central and other railroads (Map: Illinois, C 6). It is the seat of the Southern Illinois Normal University, which has a good library, museum, laboratories, and other well-equipped buildings. The city has flour-mills, iron-works, and other industrial establishments, is the centre of an agricultural and coal-mining region, and ships coal, fruit, flour, grain, etc. Population, in 1890, 2382; in 1900, 3318.

CARBONDALE. A city in Lackawanna County, Pa., 16 miles northeast of Scranton; near the head of the Lackawanna River, and on the Erie, the Delaware and Hudson, and the New York, Ontario and Western railroads (Map: Pennsylvania, F 2). It is in the centre of one of the most important anthracite coal-mining districts in the State, and has silk-mills, foundries and machine-shops, car-shops, etc. The city has a public library, Emergency Hospital, and a small park in the heart of the city, containing a soldiers' monument. Settled in 1824, Carbondale was incorporated in 1851. It is governed by a mayor, elected every three years, and a bicameral city council. The mayor, with the consent of the council, appoints policemen and the health board; the council elects the city engineer, clerk, and attorney; all other offices are filled by popular election. Population, in 1890, 10,833; in 1900, 13,536.

CARBON DISUL'PHIDE, or Bisulphide (*carbon* + *disulphide*, from Gk. δι-, *di-*, double + *sulphide*, and *bisulphide*, from Lat. *bi-*, double + *sulphide*). CS_2. An unstable compound of carbon and sulphur, analogous to carbon dioxide, whose formula is CO_2. It may be prepared by passing the vapors of sulphur over charcoal kept at a red heat. On a large scale it is prepared as follows: A cast iron cylinder containing charcoal is placed in a furnace and heated to the required temperature. The cylinder is provided with two tubes, through one of which sulphur vapors or pieces of sulphur are introduced, while the other serves as an exit for the vapors of carbon disulphide, which are liquefied in a suitable condenser. Pure carbon disulphide is a heavy colorless liquid of a rather pleasant etheric odor; the ordinary preparations, however, have a most sickening smell, owing to the presence of impurities. The specific gravity of the purified compound at 0° C. is 1.293. It has a high refracting power and mixes in all proportions with absolute alcohol, ether, hydrocarbons, and other organic liquids. It is an excellent solvent for many substances, such as sulphur, phosphorus, india-rubber, gutta-percha, the resins, fats, etc. Water does not mix with it, and alcohol containing a considerable amount of water dissolves it only to a limited extent. The boiling-point of carbon disulphide is 46° C. At high temperatures it dissociates into its constituents, carbon and sulphur. With the sulphides of the alkali metals in aqueous solution it forms compounds analogous to the carbonates and called thiocarbonates: the formula of potassium thiocarbonate is K_2CS_3: that of potassium carbonate being K_2CO_3. The thiocarbonates are used for destroying vermin. Carbon disulphide is largely used as a solvent, in preparing fats, extracting vegetable oils, etc. It may also be employed for the purpose of producing low temperatures; if evaporated rapidly, as by passing a current of dry air through it, its temperature is reduced as low as 60° below zero Centigrade. Owing to high refracting power. it is employed for scientific purposes in optics. Mixed with nitric oxide its vapors give a bright bluish-white flame which has been employed for photographic purposes.

CARBONEAR, kär'bon-ēr. A port of entry on Conception Bay, Newfoundland, 25 miles northwest of Saint John's (Map: Newfoundland, G 5). Population, in 1891, 4127; in 1901, 3703.

CARBONIC-ACID GAS, or CARBON DIOXIDE (*carbon* + *dioxide*, from Gk. *δι-*, *di-*, double + *oxide*), CHOKE-DAMP, or FIXED AIR. A gaseous compound of carbon and oxygen represented by the formula CO_2. It occurs in the free state as a constituent of atmospheric air, and in solution in sea-water and mineral springs. It is largely evolved from fissures in the earth, especially in volcanic districts: in certain localities in Java and in the neighborhood of Lake Laach, near the Rhine, the amount of carbon dioxide evolved is so great that birds attempting to fly across the poisonous spots drop dead. The famous Dog Grotto, near Naples, is likewise filled to a certain height with carbonic-acid gas, by which dogs brought into the grotto are rendered insensible in a few seconds. The experiment is often performed, on payment of a small fee, for the amusement of travelers. The amount of carbonic acid normally contained in atmospheric air is relatively small—10,000 volumes of air contain about 3 volumes of carbon dioxide; or, which is the same, 10,000 parts by weight of air contain about 4.5 parts by weight of carbon dioxide. Animals constantly add to this by respiration: plants, on the contrary, absorb the gas, which they transform, with the aid of light, into oxidizable food-matter. As a result, the amount of carbonic acid in the atmosphere tends to remain constant. However, the principal cause of the constancy of the composition of our atmosphere lies in the fact that the water of the ocean contains immense quantities of free carbonic acid. If the amount of the latter in the air should rise above the normal, the excess would be dissolved in the sea; conversely, a certain amount of the gas would escape from the water if the amount in the air should fall below the normal. Slight variations, however, have been observed. Thus, in elevated places the amount of carbonic acid is usually smaller than near the level of the sea. In the vicinity of forests, too, especially in summer, the air contains somewhat less carbonic acid than the air in cities.

The average amount of carbonic acid produced in twenty-four hours by man is about 900 grams, the amount given out during the day being considerably greater than that produced during sleep. It has been recently suggested that the air in closed rooms may be continually purified and renewed by the use of sodium peroxide, a substance which has the property of absorbing carbonic acid and of giving off an equivalent amount of pure oxygen. The total amount of free carbonic acid in nature is obviously very great. But even larger quantities, probably, exist combined in the forms of carbonates, such as chalk and limestone, forming part of the solid crust of the earth. For experimental purposes carbon dioxide is most easily prepared by the action of dilute hydrochloric acid on chips of marble (calcium carbonate). The large quantities of carbonic acid employed in the arts are prepared in several different ways. Usually dilute sulphuric acid is made to act on some porous variety of calcium carbonate, such as chalk. In the manufacture of mineral waters, magnesite or the densest varieties of dolomite are employed, as they are liable to contain a smaller amount of organic matter than other materials. The carbonic acid used in sugar-manufactories for precipitating lime is made by burning charcoal; the gas evolved from lime-kilns, or that produced by fermentation, is largely used for the same purpose. Carbonic acid is also extensively used in the manufacture of soda. The gas employed in making artificial mineral waters (q.v.) must be carefully purified by passing it through solutions of potassium permanganate, which retains all organic impurities without attacking the gas itself. Carbonic acid does not support combustion; it is, therefore, used, highly compressed in iron cylinders, as a fire-extinguisher. Besides the methods mentioned above, carbonic acid may be prepared by simply heating metallic carbonates; thus, in determining nitrogen, in organic analysis, the air is best expelled from the combustion-tube by means of carbonic acid made by heating sodium bicarbonate or magnesium carbonate. Pure carbon dioxide is a colorless gas about one and a half times as heavy as air; it has a feeble odor and a slightly acid taste. Owing to its high density, it does not rapidly diffuse through air, and may be poured like a liquid from one vessel into another. When absorbed by plants, its carbon is transformed into carbohydrates, while the whole of its oxygen is returned to the atmosphere. When introduced into the stomach of man (say in the form of some mineral water), it has a refreshing effect, and promotes digestion. If inhaled, however, it is supposed to decompose the hæmoglobin of the blood and to enter into combination with the colored product of decomposition called hæmochromogen. It has been shown, nevertheless, that the animal organism is capable of adapting itself in a peculiar way to the action of carbonic acid; birds confined within air-tight jars are capable of living in an atmosphere in which an animal introduced directly from fresh air would die in a very short time. The simplest way of testing the air in a room is to introduce a burning candle; if it continues to burn quietly and with a bright flame, the air is pure and respirable. The amount of carbonic acid in rooms should not exceed two grams to the cubic meter of air. Water containing free carbonic acid is capable of attacking many substances that pure water cannot dissolve. Many rock formations have been destroyed by the action of such water on the carbonate of lime contained in them. Under ordinary conditions of pressure and temperature, carbon dioxide dissolves in water in accordance with the law of Henry; that is to say, the amount of gas absorbed is proportional to the pressure. This shows that the existence of the hypothetical compound of water and carbon dioxide ($H_2O + CO_2 = H_2CO_3$) in the free state is highly improbable, though its derivatives, the carbonates, are among the substances commonly met with in nature. At 0° C. carbon dioxide is liquefied under a pressure of 36 atmospheres. The critical temperature was ascertained by Andrews, and, more recently, by Dewar. The latter investigator found that above 31.9° C. a pressure of 77 atmospheres is necessary and sufficient to liquefy it. Liquid carbonic acid is now largely used in the arts. A mixture of liquid carbonic acid and ether, if rapidly evaporated, attains a temperature of about 100° C. below the freezing-point of water. Chemically, carbonic acid is a dibasic acid capable of forming salts in which metallic elements are substituted either for one or for both of the hydrogen atoms. These salts, called *carbonates*, are readily decomposed by most other acids known in chemistry, carbonic acid being one of the weakest acids known. Even the so-called *acid* carbonates of sodium and potassium have a feebly alkaline reaction, carbonic acid being incapable of neutralizing the powerful alkaline properties of sodium or potassium hydroxide. Carbonic acid is the earliest known gas. Paracelsus and Van Helmont, who lived in the Sixteenth Century, knew that the gas produced in burning charcoal was identical with that evolved by limestone heated to a high temperature. About the middle of the Eighteenth Century Joseph Black isolated it in a perfectly pure state. In the latter part of the Eighteenth Century Priestley discovered it in the air, and Lavoisier showed that the same gas was produced during the combustion and decay of vegetable and animal matter, during respiration, etc. Faraday was the first to liquefy it. See CHEMISTRY.

CARBONIC OXIDE, CO. A gaseous compound of carbon and oxygen. It does not occur naturally, but may be observed burning with a pale-blue flame in fireplaces and stoves. During the combustion of lower layers of the fuel, the oxygen of the air unites with the carbon of the fuel to form carbonic acid, CO_2; and this gas, rising through red-hot coal, has part of its oxygen abstracted by the latter, and, as a result, carbonic oxide is produced, which, taking fire on the top of the coals, burns, abstracting more oxygen from the air and re-forming carbonic acid, CO_2.

Carbonic oxide may be prepared by heating either potassium ferrocyanide or oxalic acid with strong sulphuric acid. It is a colorless gas somewhat lighter than air, in which it burns with a characteristic bluish flame. It is exceedingly poisonous, forming a chemical compound with the hæmoglobin of the blood, and thus preventing the latter from carrying the oxygen which is necessary for supporting the processes of life. The symptoms of carbonic-oxide poisoning are headache, dizziness, and nausea, which, if the inhalation of the gas is continued, terminate in death. Hence the great danger arising from checking the escape of the products of combustion in stoves and furnaces, or of allowing illuminating gas to escape into rooms. Ordinary coal-gas contains about 8 per cent., water-gas about 40 per cent., of carbonic oxide. The presence of carbonic oxide in the air may be best detected by means of a solution of palladium chloride; if a cloth moistened with a strong solution of this salt is exposed to air containing traces of the poisonous gas, a distinct brown coloration is produced. Among the compounds of carbon, carbonic oxide is the only one in which that element occurs in the divalent state; in all other compounds carbon is quadrivalent. It has, however, been suggested that, on the contrary, the other element (oxygen) contained in it may be quadrivalent, though it is generally found combined as a divalent element. See VALENCY.

CAR'BONIF'EROUS LIMESTONE (Lat. *carbo*, coal + *ferre*, to bear), or MOUNTAIN LIMESTONE. A term used by Murchison, Lyell, and others to include much of the middle and lower portion of the Carboniferous system (q.v.), as now defined.

CARBONIFEROUS SYSTEM. One of the main divisions of the Paleozoic group of rocks, comprising all strata that lie between the Devonian and Triassic systems. The name was first used in England, because of the coal-seams contained in the strata, a characteristic now known to be of almost world-wide importance. The rocks of this system include a vast series of sandstones, shales, conglomerates, limestones, and beds of coal, which are of variable thickness and more or less interbedded. There is seldom any unconformity between the Carboniferous and underlying Devonian rocks in either Europe or America, and where isolated examples are known, as in parts of Nova Scotia, New Brunswick, Great Britain, and Bohemia, they indicate local disturbances. Coincident with this absence of any great stratigraphical break, there is also a gradual transition from the Devonian to the Carboniferous faunas. The rocks often show a basin-shaped arrangement, and in some areas, as in northeastern Pennsylvania, there is intense folding; but still there are thousands of square miles in China, western North America, and Russia which are under lain by nearly horizontal Carboniferous strata.

The different types of Carboniferous rocks mentioned above are divisible into two general groups—viz.: (1) Marine sediments, usually limestones, containing many invertebrate remains, such as corals, mollusks, encrinites, etc. The abundance of coral remains in some of them lead us to suppose that they represent fossil coral reefs. These Carboniferous limestones sometimes assume great thickness, as in Great Britain and western North America. (2) Shallow-water deposits, such as sandstones, conglomerates, or shales, deposited in shore waters or estuaries. These shallow estuaries or lagoons, by the formation of land across their mouth, often became converted into seacoast swamps in which there was a profuse growth of tall plants. These swamps were often of enormous extent, but at times the long-continued swamp growth became temporarily interrupted by the deposition of clay washed in either by flooded rivers or by the muddy waters of the sea breaking in. Or, again, the sinking of the area below the ocean level may have caused the accumulation of much sediment over the swamp growth.

Subsequently the plant accumulation became changed to coal, and the clay to shale. We find records of these changes at the present day in the alternating coal and shale seams.

Carboniferous rocks are widely distributed over the globe, underlying wide areas in North America, South America, Europe, China, Africa, and Australia. In classifying the rocks of these areas, the divisions of the first order are the same, but the smaller divisions are commonly local ones. The first order division consists in grouping the Carboniferous into:

(1) Sub-Carboniferous, known also as Lower Carboniferous, and Mississippian.

(2) Carboniferous proper, Coal Measures, or Pennsylvanian.

(3) Permian, Upper Carboniferous, or Dyas.

The Permian is considered by some European geologists as a separate system, coequal with the Carboniferous; in the Mississippi Valley it is, however, inseparable from the upper non-coal-bearing fossiliferous limestones of the Mississippian stage. In the United States the Carboniferous sections along the Appalachians and in the Mississippi Valley are divided as follows: Pennsylvania—Sub-Carboniferous, (1) Pocono sandstone; (2) Mauch Chunk sandstone and shale; Carboniferous, (1) Pottsville conglomerate or millstone grit; (2) Lower productive measures, including coal, shale, and sandstones; (3) Lower barren measures, including sandstones and shales; (4) Upper productive measures, including coal, shale, and sandstones; Permian or Upper barren measures. Mississippi Valley—Sub-Carboniferous, (1) Kinderhook; (2) Osage, including (a) Burlington; (b) Keokuk; (c) Warsaw; (3) St. Louis group; (4) Chester or Kaskaskia group. Carboniferous, (1) Millstone grit; (2) Coal measures; Permian.

In the United States the Carboniferous is found underlying a number of areas. In Rhode Island there is a small one of highly metamorphosed rocks, in which the coal-beds have been nearly changed to anthracite. A large area extends from Pennsylvania southward to Alabama, and westward to Missouri and Arkansas and Texas. Along the Appalachians the prevailing rocks of this area are sandstones and shales, which contain many coal-seams and are much folded; but westward the folds die out, and limestones begin to predominate. Workable beds of coal are found in all the States of this area. In the Mississippi Valley the crinoidal limestones are important members. The Carboniferous section shows a variable thickness, having a maximum of nearly 8000 feet in Pennsylvania, and only 1200 to 1500 in Illinois. Near Pottsville, Pa., there are twenty-five coal-beds, whose aggregate thickness is 154 feet. In Alabama there are seventeen in one field. In the Western interior region, especially near the summits of the Rocky Mountains, there are Carboniferous strata consisting mostly of limestones, with no coal. There are also scattered areas in the Great Basin region, and along the Pacific Coast and in the Arctic region. The coal-beds are usually underlain by clay-beds, in which are sometimes found the upright roots and trunks of trees that grew in the Carboniferous swamp.

In Europe, the coal measures of England are 3000 to 5000 feet thick, increasing even to 12,000 feet in South Wales. The Permian beds in Russia are of enormous extent, covering an area twice as large as France. Carboniferous rocks also occur in Germany, France, Belgium, and Austria. In China they extend over many thousand square miles as vast tablelands, and contain perhaps the richest coal deposits of the world. They are also extensively developed in India, and in Australia and Africa.

Both animal and vegetable remains are abundant in the Carboniferous, and are in many cases well preserved. The abundance of the latter is easily understood when we remember that coal has been formed by the accumulation of vegetable matter, and we consequently find the plant fossils in the coal itself, as well as the inclosing beds. There is a great uniformity of character in the plant life, the same genera and often the same species occurring in widely separated regions. About 2000 species are known which, with the exception of a few plants of doubtful relationship, may be referred to the following families: Equisetaceæ, lycopods, conifera, and ferns. Of the equisetaceæ, the most abundant genus was Calamites (q.v.), which included several species of large, tapering, reed-like plants that apparently flourished on the borders of the coal swamps. The lycopods were represented by the Sigillaria (q.v.) and the Lepidodendron (q.v.), closely related genera that are believed to have furnished a large part of the material for the formation of coal. The Sigillaria had gently tapering, fluted stems, which grew to a height of 50 feet or more, and had a diameter of 5 feet. The bases of the trunks, with their radiating roots, are often found in the clay that underlies the coal-seams, and for a long time they were supposed to be a distinct species. (See STIGMARIA.) The Lepidodendron bore a great resemblance in structure and appearance to the club-moss of the present day, but it attained gigantic proportions. Conifers were probably abundant in Carboniferous times; they differed widely, however, from existing conifers, and bore nut-like fruits, which have been frequently preserved. (See TRIGONOCARPUS.) The genus Cordaites, which appears to have been very abundant, is classed by some botanists with the conifers; by others, with the cycads. The fern family was represented by a large variety of species, some of which were tree-ferns. The most common forms were Sphenopteris, Cyclopteris, Neuropteris, Odontopteris, and Pecopteris. The animal remains of the Carboniferous system are both numerous and well preserved, but they are found in greatest abundance in the Sub-Carboniferous limestones. Corals and crinoids are numerous, both as regards individuals and species, and in places constitute great thicknesses of rock. More than 650 species of crinoids have been described from the Sub-Carboniferous of America alone. Among the brachiopods, Productus, Spirifer, and Chonetes are most numerous, while mollusks are represented by cephalopods, gastropods, and lamellibranchs, some species of which pass out of existence at the close of the period. Trilobites are present, but not in such variety as in the earlier Paleozoic times, and they diminish rapidly toward the end. Crustaceans are abundant, especially Beyrichia and Estheria, and they show a rapid development. Insects appear to have flourished in great numbers; the known varieties include spiders, scorpions, dragon-flies, grasshoppers, and cockroaches. Among fishes, the ganoids and selachians are represented. The ganoids, having their entire surface covered with scales, were numerous; some of them inhabited shallow water near the shore, and fed on crustaceans and shell-fish, for crushing which they had a formidable apparatus of conical teeth of a very complicated structure. Others were inhabitants of deep water, and were more powerful and predaceous and more rapid in their movements. Their jaws were produced into a long snout, like the crocodile of the Ganges, and armed with a double series of enormous teeth, which were sometimes as much as 4 inches long by 2 inches broad, as in Megalichthys (q.v.), dimensions rarely attained even by the largest known reptiles. Associated with these were a great number of sharks belonging to the Cestraciontidæ, a family of which we have only a single living representative. (See Cestraciont.) They had a long, bony spine, to strengthen the dorsal fin, and this enabled them to turn speedily in the water, as they required to do in seizing their prey. These spines are often found fossil. The only remains referred to a higher division of the animal kingdom yet found belong to the saurian Stegocephalia (q.v.). The Carboniferous also contains the first traces of amphibians. Of these, only footprints were found in the Lower Carboniferous, but in the coal measures the actual bones were met with. The Permian beds of both Europe and America have furnished the first reptilian remains: these belonged to the tribe Rhyncocephalia, which is now nearly extinct.

The alternation of rocks of different character show that oscillations of the land surface must have been extensive and long continued, though not violent. Thus the great beds of coal indicate a period of inland shallow water in which swampy conditions existed. These must have continued for a long period, for the coal-beds are often very thick, and it has been calculated that an eighth of an inch of coal means at least one inch of plant accumulation. That these swamp areas became at times submerged to some depth, due to the sinking of the land, is indicated by the pressure of limestone-beds over them. The climate that predominated during the Carboniferous was one of warmth and moisture, with the percentage of carbon dioxide in the atmosphere somewhat greater than it is now, but not necessarily excessive.

The great importance of the economic minerals in the Carboniferous has had much to do with our extensive knowledge of it. It is estimated that there are 400,000 square miles of the earth's surface underlain by productive coal-fields. (See Coal.) In addition to the coal deposits, many other useful minerals are found in the Carboniferous of the United States. The clay-beds associated with the coal-seams afford valuable supplies of fire-clays, pottery-clays, and brick-clays; iron ores are found in Pennsylvania, Kentucky, and Ohio. Building-stones are quarried in the Carboniferous of many States, the sandstones of Berea, Ohio, being specially important. The Lower Carboniferous strata furnish salt in Ohio, Michigan, and West Virginia, and zinc ore in Missouri, Kansas, and Arkansas.

Consult: Dana, *Manual of Geology* (New York, 1895); Geikie, *Text-book of Geology* (London, 1893); *United States Geological Survey Bulletin* No. 80 (Washington, 1891). See Coal; Geology; Clay; Iron.

CARBONS, Electric Light. See Electric Lighting.

CARBORUNDUM. A compound of carbon and silicon with the formula SiC, the two elements being united atom to atom. It crystallizes in small rhombohedral plates of hexagonal outline, which may be colored by impurities in various shades of blue or green. The substance, possessing a hardness that exceeds that of the ruby, is largely used as a substitute for emery and corundum for abrasive purposes. It is manufactured in an electric furnace by exposing a mixture of carbon and sand to a high and long-continued heat. The crystals are crushed, and the powder digested with dilute sulphuric acid to remove impurities; after which it may be made into wheels, polishing cloth, etc. The output in 1900 by the works at Niagara Falls, N. Y., was 2,401,000 pounds, valued at $216,000. Carborundum was first obtained by E. S. Acheson in 1890, during a series of experiments for the production of artificial diamonds.

CARBOY (Pers. *qarābah*, a sort of bottle). A large glass bottle, cased in wicker, or protected by a wooden box, used to contain acids or other corrosive liquids, such as sulphuric acid (oil of vitriol). A carboy of sulphuric acid contains about 160 pounds of that acid.

CARBUNCLE (OF., from Lat. *carbunculus*, gem, from *carbo*, coal). A name applied to the scarlet and crimson varieties of garnet when cut with a convex face (*en cabochon*). The ancients applied the name indiscriminately to all red and fiery stones, as *spinel* and *Oriental ruby*. Carbuncles were highly prized for their supposed mysterious power of giving out light in darkness. According to the Talmud, the only light that Noah had in the ark was furnished by carbuncles and other precious stones. The famous necklace of Mary Queen of Scots had a lustrous carbuncle as a pendant.

CARBUNCLE (Lat. *carbunculus*, a little coal). An acute inflammation of the cellular or connective tissue beneath the skin, that may occur on any part of the body, but is more frequent on dorsal surfaces, especially on the back of the neck and shoulders. It derives its name from the two most prominent symptoms—redness and burning pain. It quite closely resembles, especially in its early stages, the common furuncle, or boil, but the symptoms, both local and general, are much more severe. The development of the carbuncle is accompanied by constitutional disturbances, such as chills, fever, aching, and general malaise. The severity of the inflammation varies, and is regularly accompanied by death of a portion of the tissue. The first local manifestation consists in slight swelling and redness. The part feels hard, and this hardness extends deeply into the tissues. As the local lesion advances, the redness assumes a dark purple or livid hue, and several small blisters appear on the surface. These open and discharge a thin, viscid fluid, rarely pus. At the centre of the carbuncle the tissue usually dies, and, becoming gangrenous, constitutes the 'core.' This central area is generally quite extensive, and consists of an infiltration of a mass of tissue, all of which sloughs away in time. The entire area of the carbuncle usually becomes fixed quite early in its development, and the carbuncle limits itself to that area. The treatment of carbuncle is both surgical and medical, the former consisting in free incisions, packing with gauze, and antiseptic dressings; the latter, in general, tonic treatment.

CARCAGENTE, kär'kȧ-hän'tȧ. A town of Valencia, Spain, situated about 25 miles south of the city of Valencia, and near the right bank of the Júcar (Map: Spain, E 3). It is well built, with good streets, and has a palace belonging to the Marquis of Calzada. It produces linen, silk, and woolen, and has a population of (1900) 12,351.

CARCAJOU, kär'kȧ-jōō (Fr. form of the American-Indian name). A Canadian name for the wolverine, sometimes improperly applied, especially by the older writers, to the panther. See WOLVERINE.

CAR'CANET (Low Lat. *carc[h]annum*, a collar of jewels, OHG. *querca*, throat). A jeweled chain or necklace. Venice was famous for the manufacture of carcanets in the Fifteenth Century.

CARCANO, kär-kä'nō, GIULIO (1812-84). An Italian author, born in Milan. He was appointed professor at the Academy of Fine Arts in Milan in 1859, and became a Senator in 1876. His publications include tragedies, which met with little success; translations of Shakespeare's plays; volumes of poetry, of which the best known is his *Poesie varie edite ed inedite* (2 vols., 1860-70); and romances, for which he is chiefly celebrated, and which are distinguished by their charming pictures of family life in Italy. A complete edition of his works (Milan, 1892) appeared after his death. Consult: Rizzi, *Prefazione alle lettere di Giulio Carcano* (Milan, 1887), and Prina, *Giulio Carcano* (Florence, 1884).

CARCAR, kär'kär. A city of Cebú, Philippines, 23 miles southwest of Cebú, the capital of the province. It is situated on the eastern coast of the island, near the Bay of Carcar. The city was founded in 1624. Population, in 1898, 30,300.

CARCASS (OF. *carcois*, quiver, from Med. Lat. *carcassium*, a corruption of *tarcasius*, from Pers. *tarkash*, quiver, by association with Med. Lat. *carcassium*, carcass). An incendiary shell filled with a fiercely burning composition consisting of saltpetre, sulphur, resin, turpentine, antimony, and tallow, and generally designed to be fired from a mortar. It had usually three large vents, through which the flame escaped. In some carcasses the vents were fitted with short barrels loaded with balls, so arranged as to discharge their contents at the time desired.

CARCASSONNE, kär'kȧ'sōn'. Capital of the Department of Aude (Languedoc), France, and see of a bishop, on the river Aude and the Canal du Midi, about 55 miles southeast of Toulouse (Map: France, J 8). It is divided into two parts—the old and new towns. The modern town is well built, with streets running at right angles to each other, squares adorned with trees, pleasant boulevards, and several marble fountains. The old town, built on a height, is much more picturesque, with its double line of walls and towers, some parts of them dating from the time of the Visigoths, and the rest, with the castle, from the Eleventh or Twelfth Century. Other conspicuous buildings are the lately restored cathedral of Saint Nazaire (Eleventh Century), the court-house, the prefecture, and the curious old market. The town contains a lyceum, a teachers' college, a seminary, and a public library of 36,600 printed volumes and 389 manuscripts, and a museum. The cloth manufactures are important, employing a large number of operatives. Carcassonne has also manufactures of paper, leather, linen, and soap, and considerable trade in wine, brandy, and dried fruit. The whole department is represented at the November fair, where horses, grain, iron, and ironware are sold in great quantity. Population, in 1901, 30,720. The ancient name of the town was Carcaso. It was a place of some note in the time of Cæsar. Consult: Viollet-le-Duc, *Carcassonne* (Paris, 1858); Peixotto, "Carcassonne," in *Scribner's Magazine*, Vol. XXIX. (New York, 1901).

CARCHEMISH, kär-kēm'ĭsh. The northern capital of the ancient Hittite nation, and for a long time an important trading centre. It was situated on the Euphrates not far from the point where that river approached nearest to the Mediterranean. As early as in the period of the Egyptian campaigns in Syria, which began c.1800 B.C., Carchemish was in existence, and Thotmes III. makes mention of having taken some of its inhabitants as prisoners. About B.C. 1120 Tiglathpileser I. of Assyria defeated the Carchemishites and plundered the city, but despite this, the city and the district of which it was the centre continued to give the Assyrians considerable trouble, and it was not until B.C. 717 that Sargon II. finally put an end to the Hittite power. It was at Carchemish that King Josiah (B.C. 609) met defeat and death at the hands of Necho of Egypt (II. Chron. xxxv.), and here Nebuchadnezzar overcame Necho four years afterwards (Jer. xlvi. 2) (B.C. 605). Carchemish has been identified with Jerablus, or Jerabis, a village on the west bank of the Euphrates not far from Biredjik. The meaning of the name has not yet been ascertained, though the first element, Kar, in all probability signifies, as in many Semitic names, 'fortress.' The town was formerly incorrectly supposed to be identical with the classical Circesium.

CAR'CINO'MA. See TUMOR.

CAR'DAMINE. See CRESS.

CARDAMOM (Fr. *cardamome*, Lat. *cardamomum*, Gk. καρδάμωμον, *kardamōmon*, from Gk. κάρδαμον, *kardamon*, a cress + ἄμωμον, *amōmon*, a spice-plant). The capsule of certain species of plants of the order Zingiberaceæ, and belonging to at least two genera—Amomum and Elettaria. Cardamoms are three-celled, and contain numerous wrinkled seeds, which form an aromatic, pungent spice, weaker than pepper, and with a peculiar but agreeable taste. On account of their cordial and stimulant properties, they are employed in medicine very generally, to qualify other medicines. They are also used in confectionery, although not to a great extent. In Asia they are a favorite condiment, and in the north of Germany they are used in almost every household to flavor pastry. The cardamom recognized in the British and American pharmacopeias and called true or official cardamom —also known in commerce as Malabar cardamom — is the produce of *Elettaria repens*, or *Elettaria cardamomum*, a native of the mountains of Malabar, and is cultivated in India, Ceylon, etc. The seeds depend for their qualities on a peculiar, pungent essential oil, called oil of cardamom, which may be obtained from them by distilling with water, and which, when fresh, is colorless. They also contain 10 per cent. fixed oil. Other kinds of cardamom occur in commerce, but none is equal to the true cardamom in commercial value. The different kinds of cardamom differ not only in strength, but in the character of their aroma, though the plants producing them have much general similarity.

CAR′DAN, Jerome, often referred to as Hieronymus Cardanus or Girolamo Cardano (1501-76). An Italian mathematician, born at Pavia, the illegitimate son of Facio Cardan, a jurist. He was at once an astrologer and a genuine philosopher; a gambler and charlatan, and a true devotee of science. As early as 1523 Cardan taught mathematics at Pavia. In 1526 he took the degree of doctor of medicine at Padua, and spent the following seven years practicing medicine at Sacco. Here Cardan met his wife, and is said to have squandered her fortune in gambling. In 1534 he was appointed to the chair of mathematics at Milan, and while holding this post, and at the same time practicing and teaching medicine, he produced his principal works, which are noticed below.

In 1552 he started on an extensive journey through central and northern Europe, and in 1559 obtained the chair of medicine at Pavia, and later at Bologna, remaining there from 1562 until 1570. While living in Bologna he was imprisoned for debt, or on the charge of heresy for having published the horoscope of Christ, and on his release resigned his professorship at the university. He then went to Rome, and was admitted by Pope Gregory XIII. to the College of Physicians, and allowed a pension. He died in Rome in 1576.

The *Ars Magna* (1545), by far the greatest work of Cardan, contains the celebrated solution of the cubic equation. The solution had been discovered in 1541 by Tartaglia, who communicated it to Cardan under the most solemn vows of secrecy. Cardan, nevertheless, published the solution under his own name, and hence arose a dispute over the authorship of the discovery. After ten years of controversy, challenge and counter-challenge, Tartaglia began publishing his own work (1556), but died before reaching the chapter on the cubic equation. Thus the greatest mathematical discovery of the Sixteenth Century came to be known as Cardan's method. The solution, as given by Cardan in geometrical terms, is, briefly, as follows: To solve the equation $x^3 + 6x = 20$, take two cubes such that the rectangle of their respective edges is 2 and the difference of their volumes is 20; then x is equal to the difference between the edges of the cubes. In the general equation $x^3 + px = q$, the rectangle of the edges is a third of p, and the difference of the volumes of the cubes is q. The publication of the *Ars Magna* stimulated mathematical research, and hastened the general solution of biquadratic equations, of which Cardan himself had solved special cases, as $13x^3 = x^4 + 2x^3 + 2x + 1$; although the credit of producing the first general solution belongs to his pupil Ferrari. Cardan recognized negative roots, which he designated as fictitious; he also observed that imaginary roots occur in pairs, but discarded them as impossible, and failed to understand the irreducible case of the cubic. He found the relation of the roots to the coefficients of an equation, recognized that the change of sign of a function implies a solution, and gave a method of approximating the roots of numerical equations. His discussions of quadratic equations are hardly superior to those of Mohammed ben Musa.

Besides the *Ars Magna*, his most important works include: *Practica Arithmeticæ Universalis* (1539); *De Subtilitate Rerum* (1551), and its sequel, *De Varietate Rerum, Artis Magnæ sive de Regulis Algebraicis lib. unus* (1545); *De Vita Propria* and *De Libris Propriis* (1571-75); *Encomium Geometriæ* (1535); *De Regula Aliza, Exæreton Mathematicorum, Sermo de plus et minus* (1540-50). The standard collection of Cardan's works is that of Sponius (Lyons, 1663). Consult: Morley, *Jerome Cardan* (London, 1854), and Rixner and Siber, *Leben und Lehrmeinungen berühmter Physiker am Ende des XVI. und am Anfange des XVII. Jahrhunderts* (Sulzbach, 1820).

CARDBOARD. A material prepared by pasting together several layers of paper, according to the thickness and quality required. *Bristol-board*, used by artists, is made entirely of white paper; ordinary cardboard, of fine white paper outside, with one or more sheets of coarse cartridge paper between. According to the number of layers, they are called *three, four, six*, or *eight sheet* boards. *Millboard*, used by bookbinders as the basis of book-covers, is made of coarse brown paper, glued and strongly pressed.

The enameling of visiting-cards and fine cardboard is produced by brushing over the cardboard a mixture of *China* or *Kremnitz white* (a fine variety of white lead) and size. After drying, this surface is rubbed lightly over with a piece of flannel, previously dipped in finely powdered talc; it is then polished by rubbing vigorously with a hard, close-set brush.

CARDENAL, kär′de-näl′, or **CARDINAL,** Pierre or Peire (c.1205-c.1305). A French troubadour, born at Puy-en-Velay. He passed most of his life at various courts, and found especial favor with James I. of Aragon. His poems, which consist chiefly of sirventes, satirizing the clergy and nobles of his day, are both original and vigorous. About seventy are published in Mahn's *Gedichte der Troubadours* (4 vols., Berlin, 1856-73). Consult: Fauriel, *Histoire de la littérature provençale* (3 vols., Paris, 1846), and Diez, *Leben und Werke der Troubadours* (Leipzig, 1882).

CARDENAS, kär′dȧ-näs. A seaport of Cuba, in the Province of Matanzas, situated on the northern coast of the island, about 80 miles east of Havana, with which it is connected by rail (Map: Cuba, D 3). It is regularly built with wide streets and broad plazas, one of which is the site of a statue of Columbus, and has several notable buildings. Cardenas is one of the important commercial centres of the island, its chief export being sugar. The trade is, to a large extent, conducted by American firms. On May 11, 1898, Cardenas Bay was the scene of an engagement between the blockading vessels of the United States fleet and the Spanish batteries, in which Ensign Worth Bagley was killed, he being the first American officer to lose his life in the war. Population, in 1899, 21,940, including over 15,500 whites.

CARDENAS, kär-dā′nȧs, Garcia Lopez de. A Spanish adventurer, captain in the army of Vasquez Coronado (q.v.), in 1540, during the exploration of New Mexico and Arizona. In September, 1540, he led the first European expedition to the Grand Cañon of the Colorado.

CARDE′NIO, *Sp. pron.* kär-dā′nê-ō. A love-crazed but witty character in Cervantes's *Don Quixote.* He reappears as Octavian in Colman the Younger's *Mountaineers,* and also in D'Urfé's adaptation of the original.

CARDENIO, History of. A play once ascribed to Fletcher and Shakespeare, on the authority of Moseley in the *Stationers' Register.* The date of the entry is September 9, 1653. It has been thought to be identical with a lost play entitled *Cardenia,* or *Cardano,* acted in 1613, which Fleay also identifies with Fletcher's *Love's Pilgrimage.* All information as to its history is purely conjectural, but later authorities are unanimous in questioning Shakespeare's collaboration in it.

CAR′DIA (Neo-Lat., from Gk. *καρδία, kardia,* heart). The orifice of the stomach which admits the œsophagus was called, on account of its vicinity to the heart, by the same Greek name, *cardia,* and was probably hardly distinguished from the heart in the earliest times of Greek medicine.

CAR′DIAL′GIA (Neo-Lat., from Gk. *καρδία, kardia,* heart + *ἄλγος, algos,* pain). Pain of the heart or stomach. The name is commonly applied to the particular variety of pain called *heartburn,* arising from a disordered stomach, and accompanied with acid eructations and the presence of gas. The heart is not affected. See Indigestion.

CARDIFF (*Caer-Taff,* Fort of the Taff). A Parliamentary and municipal borough, seaport, and capital of Glamorganshire, South Wales, situated on the river Taff, near its mouth in the estuary of the Severn, 170 miles west of London by railway (Map: Wales, C 5). Its most notable building is the castle, built in the Eleventh Century, in which Robert Curthose, Duke of Normandy, died, after captivity in various fortresses during twenty-eight years. It has been carefully restored, and is occasionally used as a residence by its owner, the Marquis of Bute, to whose family Cardiff owes much of its prosperity. Other edifices of interest are the Church of Saint John, dating from the Thirteenth Century, with a fine perpendicular tower, and the free library, erected in 1882, which contains a museum and art gallery.

Although the construction of the Glamorganshire Canal may be taken as having marked the first step in the development of the town from an insignificant village to one of the most important ports of the United Kingdom, it was not until after the opening of the first great dock, in 1839, that its possibilities as an outlet for the mineral wealth of the surrounding region were fully realized. The docks and basins are five in number, and cover an area of more than 110 acres. They are owned by Lord Bute, but the town derives a considerable annual revenue from harbor dues. The municipal authorities have kept pace with the rapid growth of the town by obtaining an excellent water-supply, by introducing electric lighting, establishing public baths and a gymnasium, markets, slaughter-houses, a sewage farm, and a cemetery. In Cardiff there are several technical schools and a higher grade school, and a central free library, with six branches, all maintained by the corporation. The importance of the town lies in its commerce, especially in its coal and iron trade, although there are also ship-building yards, iron, steel, and tin plants. The export of coal to foreign countries increased from 1,451,000 tons in 1865 to 10,115,000 in 1891. In 1898 there was a temporary decline, on account of the great coal strike, the total export of coal and coke amounting to only 9,109,515 tons, as compared with 12,443,448 tons in 1897. The total number of vessels and their tonnage entering the port in 1899 was 15,389 and 9,590,000 respectively, as compared with 13,383 vessels and 6,612,000 tons in 1891. The number of vessels cleared in 1899 was 15,418, with a tonnage of 9,797,000, as compared with 13,474 vessels and 6,938,000 tons in 1891. The port in 1890 owned 270 vessels with a tonnage of 212,000, only about 2 per cent. of the tonnage belonging to sailing vessels, of which there were 61. The number of vessels shows a decline from the 306 vessels in 1891, but the tonnage capacity has increased about 25 per cent. Besides coal, the chief exports are iron and steel manufactures, machinery and mill work, railway-cars and wagons, sacks, etc. The imports comprise cattle, grain, copper, and iron ores, petroleum, timber, and market produce. The total value of imports and exports during 1900 was £17,799,500 ($88,997,500). The United States is represented by a consul. Cardiff is adequately provided with railway facilities, being connected by the Taff Vale and Rhymney lines with the mineral fields of South Wales, and by the Great Western with London. Population, in 1800, about 2000; in 1850, 18,000; and in 1901, 164,400.

The town probably existed during the Roman occupation. It was a place of importance under the Normans. During the Civil War the castle was alternately in the hands of the Royalists and the Parliamentarians. In 1648 Cromwell captured it after a bombardment lasting three days.

Consult: Stuart, "History of Cardiff," in *Archæological Journal,* Vol. XXVIII. (London, 1871); "Architecture of Cardiff," in *Builder* (London, March, 1897).

CARDIFF GIANT. A rude statue of a man 10½ feet high, cut (in Chicago) from a block of gypsum sent from Ohio. It was secretly buried near the village of Cardiff, Onondaga County, N. Y., where it was declared to have been found in October, 1869. It was exhibited with great success for several months as 'a petrified giant,' deceiving even some men of science. The fraud was finally confessed.

CAR′DIGAN (anciently, *Aberteifi,* Mouth of the Teifi). The capital of Cardiganshire, Wales, a municipal borough and seaport, on the right bank of the Teifi, 5 miles from its mouth, and about 75 miles west-northwest of Cardiff (Map: Wales, B 4). The town has a considerable coasting trade, largely in produce and slate. It owns its water-works, and maintains markets and a cemetery. Population, in 1901, 3500. Cardigan became an important town about the time of the Norman Conquest. There are the remains of a castle supposed to have been founded, in 1160, by a Norman baron. The town suffered much in the struggles between the Welsh and the English.

CARDIGAN. A novel by R. W. Chambers (1901), dealing with pre-Revolutionary times on the frontier of New York and Western Pennsylvania.

CARDIGAN, James Thomas Brudenell, Seventh Earl of (1797-1868). An English general, the leader of the 'Light Brigade' at Balaklava. He was educated at Oxford, and became a member of Parliament in 1818. In 1824 he entered the army, and by 1832 had risen, through lavish expenditure in purchasing his grades, to the rank of lieutenant-colonel. As an officer he was overbearing and quarrelsome, and treated his men with great severity. In 1837 he succeeded to the peerage. In the Crimean War he was sent to the field as a major-general in command of the light cavalry, which he led in the famous charge at Balaklava, October 25, 1854. For this he was promoted lieutenant-general, and received many honors. He published *Cavalry Brigade Movements* (1861).

CARDIGANSHIRE. A maritime county of Wales, on Cardigan Bay, with an area of 692 square miles, half being waste (Map: Wales, C 4). It is an agricultural county: the chief branch of industry is the rearing of live stock. There are some manufactures of coarse woolens, gloves, stockings, and hats. Cardigan is the county town. Among other towns are Aberystwith and Lampeter. Population, in 1891, 62,630; in 1901, 60,237.

CARDINAL (Lat. *cardinalis*, pivotal, principal, from *cardo*, a hinge). The highest dignitary in the Church of Rome after the Pope, whose elector and councilor he is. The title, however, in the ante-Nicene period, was used more generally, being applied to the clergy who were permanently attached to a cathedral church anywhere. But the usage was later restricted to particular members of the clergy in Rome. In the Fourth Century the priests permanently ruling the parish churches in Rome were styled *cardinal* priests, the deacons permanently administering each the charities of a particular 'region' of the city were styled *cardinal* deacons, while the bishops in charge of the suburban sees of Rome—viz. Porto and Santa Rufina, Ostia and Velletri, Palestrina, Sabina, Frascati, and Albano—and who were called in consultation by the Bishop of Rome, were called *cardinal* bishops. The word cardinal in each case means that the person was, so to speak, one on whom ecclesiastical affairs *hinged*.

The cardinals are now all appointed by the Pope, and constitute the Sacred College. The Pope is not at all obliged to consult them, but as a matter of fact does so, and so they share with him in the government of the vast organization of which he is the head. Their number has varied at different times, and was fixed by Sixtus V., in 1586, at 70—i.e. 6 cardinal bishops, 50 cardinal priests, and 14 cardinal deacons. The Pope is not obliged to maintain this number, and in 1902 the Sacred College was made up of 6 cardinal bishops, 52 cardinal priests, and 8 cardinal deacons. The great majority are Italian. The bishops take their names from the mentioned sees, the priests their titles from the churches in Rome to which they are appointed, while the deacons are appointed to other churches called 'deaconries.' The first cardinal bishop is the dean of the College, and has the right to consecrate the Pope if he be not at the time of his enthronement a bishop; the first cardinal deacon is first deacon of the College, and he has the right to proclaim and crown the new Pope. The camerlengo, who rules the Church during a Papal vacancy, also is a cardinal. All the cardinal bishops, and all but one of the cardinal deacons, live in Rome, but only 11 of the cardinal priests. Most of the cardinals are bishops. The archbishops of Sydney, New South Wales (Moran); of Baltimore, United States of America (Gibbons); Westminster, London, England (Vaughan); and Armagh, in Ireland (Logue), are the English-speaking cardinals. A few belong to monastic orders, including one Jesuit.

The cardinals are chief members of the twenty-one Sacred Congregations, or standing ecclesiastical committees, of the Papal Government, such as Holy Office, Propagation of the Faith, Index, Rites, and Studies. They meet in consistory, over which the Pope presides. But they are most prominent before the world on the death of the Pope, as they are the electors of his successor, and usually, though this is not obligatory, choose one of their own number. They are princes of the Church, enjoying extraordinary privileges and honors, and are entitled 'Most Eminent Prince.' They wear a distinctive scarlet dress and a red cap, which is put upon their heads by the Pope. They have also a red hat, which is given to them in a public consistory, but is not worn. They enjoy an income out of the Papal treasury. They are frequently sent by the Pope as his representatives upon delicate missions, when they are styled *legati a latere*. See Dean.

CARDINAL-BIRD, or Redbird. A large and brilliant finch or grosbeak (*Cardinalis cardinalis*), one of the finest song-birds of America, and common throughout the southern part of the United States. The general color of the male is red, the head being vermilion, with a small portion around the base of the bill black. The feathers of the crown are long, and erected into a conical crest. The cardinal-bird migrates northward in spring, but never farther than Massachusetts, where only a few stragglers are seen. Its loud, clear, sweet, and varied song is to be heard chiefly in the mornings and evenings. Partly because of the song, and partly from its beautiful plumage, the cardinal is a popular cage-bird. During the breeding season the male is very devoted to his mate and to the young. The nest is built in bushes, and consists of twigs, rootlets, and strips of bark, lined with grasses and other finer material. The eggs are usually four in number, white or bluish, speckled and spotted with brown. Geographical races of this species extend its range westward to southern California and Mexico, and allied species exist in Mexico and Central America. See Plate of Buntings and Grosbeaks.

CARDINAL DE LUGO'S (dâ lo͞o′gōz) **POWDER.** See CINCHONA.

CARDINAL-FLOWER. See LOBELIA.

CARDINAL POINTS. See COMPASS.

CARDINAL VIRTUES. According to the ancients, the virtues of justice, prudence, temperance, fortitude. They were so called because the whole of human virtue was supposed to hinge or turn upon them. In other words, they were considered as a full and comprehensive classification of a man's various duties.

This mode of dividing the virtues is to be found as far back as Socrates. The ancient moralists treated under ethics the whole sum of human duty and virtue. Thus, Aristotle considers the great problem of the science to be the determination of man's highest good, together with the means of realizing it. Hence, he includes both the social virtues and the prudential regard to the welfare of the individual in the same scheme. Of the four cardinal virtues, it will be seen that the first, justice, is the social virtue; that prudence (which, properly speaking, includes temperance also) regards the well-being of the individual; while fortitude is necessary to both. This last was a virtue greatly esteemed in the ancient world; each one's lot being much less secure than with us in the present day, it was impossible to say what sufferings might be in store for the most prosperously situated of men.

Dr. Whewell has made an attempt to correct the more obvious defects of the classification, and has substituted one which he deems free from those defects. The most notable omission in the ancient scheme, judged from the modern point of view, is the absence of all reference, either expressly or by implication, to the virtue of goodness or benevolence.

Accordingly, to adapt the classification to the altered point of view, benevolence has to be added to the list. This is Dr. Whewell's first virtue; the others are justice, truth, purity, and order. But the scheme, as thus amended, is scarcely less objectionable than before. The virtue named last, order, which means obedience to authority, cannot but contain a very large portion of all the rest; seeing that justice, truth, etc., are enjoined by positive law. Then, what is understood by purity, including the control of the two powerful appetites—hunger and sex—is partly prudential and partly social.

In Roman Catholic systems of theology, there are declared to be four *cardinal virtues*—"prudence, fortitude, temperance, and justice"—from which all other 'moral' virtues are represented as flowing. But there is a prior division of virtues into the two classes of *theological* and *moral*, the theological virtues being faith, hope, and charity. The distinction between these two classes is represented as consisting in this, that the theological virtues "*immediately* regard God," and the moral virtues do not immediately regard God, but are commanded and rewarded by God, and are beneficial to ourselves.

This method of discussion may be said to be engaged upon the form of the virtues. There is need of one which shall touch their matter. The tendency of ethics during the Nineteenth Century in America was to emphasize love as the true 'cardinal' virtue or as the element which must enter into every moral act in order that it may acquire the character of virtue. Even forms of philosophy which have seemed to ignore this principle have brought it in again under other names, such as 'altruism.' That modern tendency which has emphasized 'self-realization' as the watchword of ethics has plainly seen that the true realization of self is its fullest adjustment to all its environment, and that this involves regard to the self-realization of every other moral being, which is what is meant by love.

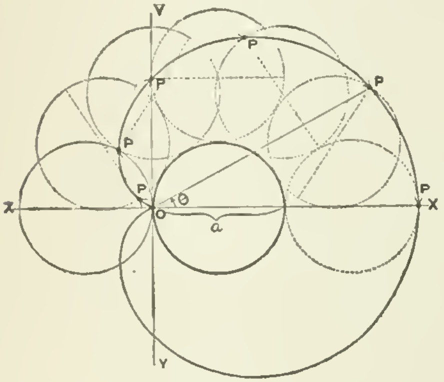
Considered under the light of this principle, as the informing and controlling principle of all action that is really good, the cardinal virtues assume more distinctness. Love regards the fundamental interests of all moral agents as the object of moral effort, or it seeks to do in every case that which will give the fullest possible amount of good to all concerned. But this is exactly what justice is—not the apportioning out of something good or bad upon the basis of an abstract and unreal standard, but the rendering to each that which shall now and here promote most fully the best good of each, while also promoting the best good of all. The same is true, *mutatis mutandis*, of the remaining virtues. A classification of virtues into the personal and the social may be valuable for certain purposes, but personal acts are virtues only as they have respect also to social relations, and vice versa. In fact, no virtue is such in isolation from others, or in disregard of the totality of concrete conditions. See ETHICS.

CARDINAL VON WIDDERN, kär′dê-näl′ fȯn vĭd′dĕrn, GEORG (1841—). A German writer on tactics, strategy, and military history, born at Wollstein (Posen). He fought in the Prussian Army in the campaign of 1866 and in the Franco-Prussian War. Subsequently he was an instructor in tactics at the military schools of Metz and Neisse. He retired from the service with the rank of colonel. His numerous publications include *Handbuch für Truppenführung* (3d ed., 1881-84), which appeared in a fourth edition as *Heeresbewegungen und Märsche* (1892); *Das Gefecht an Flussübergängen, und der Kampf an Flusslinien* (1890); and *Kritische Tage* (Pt. I., Vols. I.-III., 1897-99).

CARDING. The process of disentangling and arranging in parallel rows the fibres of cotton, wool, or flax, by the action of wire-toothed cylinders. This operation may be compared to the combing and brushing of one's hair, and the *card* combines the properties of the comb and brush, being a brush with wire teeth instead of bristles. These teeth are inserted in strips of leather, called card-clothing, which are fixed upon the surface of a cylinder. Several such cylinders are arranged so that the ends of the teeth are nearly in contact; and the material, which has previously been formed into *laps*, the width of the cylinders, being brought to them, is caught up, passed from one to the other, and combed out as the cylinders revolve in the form of beautiful films or fleeces, which are removed by a smaller drum-card, called the 'doffer,' and again from this by the 'doffing-knife.' These films, which are of the width of the drum, are next contracted to a narrow ribbon by being passed through a funnel; and thus narrowed, are called the 'card ends' or 'slivers,' and are now ready for the next process of 'drawing' or 'doubling.' Carding-machines for wool are usually arranged in series of three, called *first breaker, second breaker,* and *finisher.* For cotton there is one main cylinder with revolving flats. A double-cylinder arrangement is used for worsted. For coarser material, such as flax and jute, fewer small cylinders are required. See SPINNING.

CARDIN'IA (Neo-Lat. nom. pl., from Gk. *καρδία, kardia,* heart). An extinct genus of lamellibranchs found fossil in rocks of Triassic and Jurassic age in Europe. Its shell resembles in form that of the common Little Neck clam, but is slightly longer and of more solid build, with a smooth or concentrically marked outer surface, and without the pearly inner surface. In cross-section the two valves are heart-shaped, whence the name. The shells of this genus, of which less than a dozen species are known, are common in the lower Lias of Great Britain.

CAR'DIOID (Gk. *καρδία, kardia,* heart + *εἶδος, eidos,* shape, form). A heart-shaped curve traced by a point of the circumference of a circle that rolls around another circle of the same diameter. The curve was first studied early in the Eighteenth Century, and is a special case of Pascal's limaçon (q.v.). Referring the cardioid to rectangular coördinates so that the x-axis coincides with the diameter of the fixed circle and the y-axis is tangent to it, the equation of the cardioid is $(x^2+y^2-ax)^2=a^2(x^2+y^2)$, where a denotes the diameter of the circle. The polar equation is $OP=\rho=A(1+\cos\theta)$. The origin is a cusp. (See CURVES.) The curve is symmetric with regard to the x-axis, and its area is $\frac{3}{2}\pi a^2$, or six times the area of one of the circles. See CYCLOID.



CARDIOID.

CARDI'TIS (Neo-Lat., from Gk. *καρδία, kardia,* heart). An old name for an affection of the heart, due to infection, and consisting of a degeneration of the muscles of the heart. It is now termed myocarditis. See HEART, DISEASES OF THE.

CARDO'NA. A town of Spain, in the Province of Barcelona. It is situated on the right bank of the Cardoner, about 41 miles northwest of Barcelona, and is surrounded by walls, pierced with six gates and commanded by a castle (Map: Spain, F 2). It has an old cathedral, and in its vicinity is situated the celebrated Montaña de Sal, a hill about 265 feet high, composed of rock salt, which shines brilliantly under the rays of the sun. The salt is worked on a large scale and gives employment to many of the inhabitants. Population, in 1900, 3900.

CARDOON' (OF. *cardon,* from Med. Lat. *cardo,* thistle, Lat. *carduus,* thistle), *Cynara cardunculus.* A perennial plant of the same genus with the artichoke (q. v.). It is a native of the southern part of Europe and the northern part of Africa. It has long been in cultivation in Europe for the sake of the blanched leafstalks and midribs of the leaves, which are used as a salad, or more generally as a boiled vegetable during winter. It is but little grown in the United States.

CARDOSO, kär-dō'sō, JOSÉ JOAQUIN (1802-78). A Mexican jurist and botanist. He was born at Puebla, and graduated as a lawyer at the Colegio de San Ildefonso, Mexico, in 1828. When the secret society *Los Polkos* was organized by the Conservatives, during Santa Anna's administration, Cardoso established a lodge in opposition to it, which he called *La Escocesa,* and which exerted considerable influence. In 1854 he was a member of the Liberal convention which prepared the plan of Ayutla, and in 1857 he became a deputy to the First Congress. He repeatedly declined the portfolio of justice tendered to him by his friend, President Juarez, preferring to devote himself to botanical investigations and literary studies. In 1868 he became director of the San Augustin Library (now the National Library), an institution containing thousands of books acquired largely from the convents of Mexico. Cardoso also made several scientific excursions to Popocatepetl and Orizaba, discovering and collecting many plants which he subsequently classified Among his botanical and biographical works may be mentioned: *La herbolaria mejicana; La flora entro los Aztecas; El método de Humboldt; Linneo el Joven; Cuál fué la primera planta medicinal entre los antiguos; Autobiografías mejicanas.*

CARDS (Fr. *carte,* card. Med. Lat. *carta, charta,* card, Lat. *charta,* paper, from Gk. *χάρτη, chartē,* leaf of paper). Cards for playing games of chance are of the most remote antiquity, and of almost universal usage. There is evidence that they were in use in Egypt in the time of Joseph, but they did not appear among the Jews until after their return from the Babylonian exile. That their use extended as far east as Hindustan and China at a period long before their introduction into Europe is well attested. There is documentary proof that they were in use in England in 1240, in Spain in 1267, in Italy in 1299, in Germany in 1300, and in France in 1361. There are two theories as to who brought them into Europe. Some antiquarians maintain that they followed in the wake of the invading Saracens, who, after having spread over Asia and Africa, crossed the Mediterranean in 711. Others claim that the Crusaders brought the practice of playing cards from the East, where they had of course come in contact with the Saracens. Gambling was certainly rife among the Crusaders. There is still extant a proclamation against it, issued by the kings of England and France, who were the joint leaders of the Crusade of 1190. From whatever source playing-cards came, every nation of Europe used them, and that they had the same point of origin is pretty conclusively proved by the uniformity of the words by which they are known, both among Teutonic and Latin races. When, however, the details of a pack are named, the nomenclature varies, just as the design and the number of cards in a pack have varied. With the Anglo-Saxons the world over it is fifty-two in four suits of thirteen each, i.e. king, queen, jack and ten cards, from ten to one, according to the number of pips. In Italy thirty-six cards formed a pack, and the older characteristically German cards were only thirty-two. In China, where the early Portuguese missionaries found cards in common use, a pack consisted of thirty cards in three suits of nine each, and three superior cards. Their cards were not more than half as wide as the European variety, and were called by the very expressive word *shen*, meaning a fan, evidently a suggestion taken from an outspread hand of cards. In Hindustan the early pack consisted of ten suits of twelve each, the marks of each of the ten suits being emblematic of one of their avatars or incarnations of Vishnu. In this symbolic respect, the cards of all nations have varied from time to time. Some have been historic, some have been political satires; some have lampooned particular people; some have represented class distinctions, for instance, the early Italian and Spanish packs, instead of the modern hearts, clubs, diamonds, and spades, had swords to represent the nobility, chalices for the clergy, coins for the citizens, and clubs or staves for the peasantry. The artistic embellishment of the faces of cards would alone form a volume; among the devices were horsemen, elephants, hawks, bells, flowers, many birds, tumblers, and a host of other subjects. The four kings seemed at one time likely to lose their sway over the New World, for cards were manufactured in New York in 1848 which had neither kings nor queens, the president of hearts being Washington, of diamonds John Adams, of clubs Franklin, and of spades Lafayette. The queens were Venus, Fortune, Ceres, and Minerva, and the knaves Indian chiefs.

Spain introduced cards into the New World. Herrera mentions that when Cortes conquered Mexico King Montezuma took great pleasure in watching the Spanish soldiers play cards. Spain was more devoted to cards at that time than any other European nation. Although generally known, they were not common. Neither Petrarch, who described the social life of the first half of the Fourteenth Century, nor Chaucer, who depicted the second half, mentions cards, although they describe many other games of chance. By the middle of the next century their manufacture, even in England, had become quite a trade, for on the rolls of Parliament there is a petition, which was complied with, prohibiting their importation from abroad.

Even the names of most of the old games are only to be found in antiquarian works. Chief among them was one named in every country where it was played 'primero.' It found its way into Shakespeare, whose Falstaff says: "I never prospered since I forswore primero." It long continued a fashionable game, but was succeeded in general estimation by mauve, and piquet still survives. 'Loadam,' 'Noddy,' 'Macke,' 'Oubre,' 'Gleek,' 'Post and pan,' and 'Bank rout' are but ghosts out of the writers of the Eighteenth and early Nineteenth Century.

A detailed description of the modern games of cards will be found under their distinctive titles. Consult: Singer, *Researches into the History of Playing Cards* (London, 1816); Chatto, *Origin and History of Playing Cards* (London, 1848); Willshire, *Descriptive Catalogue of Playing and Other Cards in the British Museum* (London, 1876); Taylor, *The History of Playing Cards* (London, 1865); R. Merlin, *Origine des cartes à jouer* (Paris, 1869).

CARDUCCI, kär-dōō′chē, or **CARDUCHO**, -chō, Bartolommeo (1560-1608). An Italian painter, born in Florence. He studied under Zucchero, with whom he went to Madrid, where he painted the ceiling of the Escurial Library. He died in Spain, where most of his works are to be found, the most celebrated being a "Descent from the Cross," in the Church of San Felipe el Real, Madrid. His brother Vincenzio (1568-1638) was also a painter of celebrity, and the author of *Diálogos de las excelencias de la pintura* (Madrid, 1633).

CARDUCCI, Giosuè (1836—). An Italian poet. He was born at Valdicastello, in Tuscany, July 27, 1836, studied in Florence and Pisa, where he pursued a philological course, and in 1861 was appointed professor of Italian literature at the University of Bologna. Three years earlier he had already attracted attention by founding, with some other young poets, a literary review, *Il Poliziano*, whose purpose was to encourage poetry, modern in spirit and classic in form. Carducci's first poems were written at the age of eleven, but his earliest published volumes are *Juvenilia* (1857) and *Levia gravia* (1865), the former purely classic, the latter bearing the stamp of growing individuality. *I Decennali* (1871) first revealed him as a poet of political importance, an ardent Republican, with lofty ideals for Italy and Rome. His most famous poems are his *Odi barbare*, in which he endeavored to adapt the metres of Greek and Latin verse to the exigencies of the Italian language, and which provoked widespread controversy. *Nuove odi barbare* (1883) and *Terze odi barbare* (1889) are further experiments in the same direction, and contain some of his finest verse. Of Carducci's prose works, mention should be made of *Studi letterarii* (1893) and *Bozzetti critici* (1876). An edition of his collected works has been in course of publication in Bologna since 1889. Consult Chiarini, *I critici italiani e la metrica delle Odi Barbare* (Bologna, 1878).

CARD′WELL, Edward (1787-1861). An English clergyman and ecclesiastical historian. He was born at Blackburn, Lancashire, 1787; educated at Oxford, received the degree of M.A. in 1812 and of D.D. in 1831. In 1826 he was chosen Camden professor of ancient history. He edited the *Ethics* of Aristotle (2 vols., 1828-30), with notes, and wrote lectures on *The Coinage of the Ancient Greeks and Romans* (1883). In 1831 he was made principal of Saint Alban Hall, and held the place till his death there, May 23, 1861. Among his other publications were a student's edition of the Greek Testament (1837); Josephus's history in Greek and Latin (1837); *Documentary Annals of the Reformed Church of England from 1546 to 1716* (1839); *History of*

Conferences, etc., Connected with the Revision of the Book of Common Prayer, 1558 to 1690 (1840); *Synodalia, a Collection of Religious Canons, and Proceedings of Convocation from 1547 to 1717* (1842); and *Reformatio Legum Ecclesiasticarum* (under Henry VIII.-Elizabeth) (1850).

CARDWELL, Edward, Viscount (1813-86). An English politician. He was born in Liverpool, was educated at Winchester and at Balliol College, Oxford, and was admitted to the bar in 1838. He devoted himself to politics, however, rather than to the law, and entered Parliament in 1842. There he attached himself, personally as well as politically, to Sir Robert Peel, who chose him Secretary of the Treasury in 1845, and president of the Board of Trade in 1852. He was subsequently Chief Secretary for Ireland, Chancellor of the Duchy of Lancaster, and Secretary of State for the Colonies. In Gladstone's Cabinet (1868) he became Secretary of War and a member of the committee of the council of education. In the War Office he effected a reorganization of the army. His reforms included the abolition of the purchase of commissions, the retirement of officers, short terms of service, the localization of regiments, and improvements in military education. In 1874 he was raised to the peerage. With Earl Stanhope, he was one of the literary executors of Sir Robert Peel, and one of the editors of the Peel *Memoirs* (1856-57).

CARELESS. (1) The friend of Mellefonte and lover of Lady Pliant in Congreve's *Double-Dealer*, a Mercutio of Restoration drama. (2) Lady Dainty's suitor in Cibber's *Double Gallant*. (3) One of Charles Surface's boon companions in Sheridan's *School for Scandal*.

CARELESS, Colonel. Ruth's suitor in Sir Robert Howard's *The Committee*.

CARELESS HUSBAND, The. A comedy of intrigue by Cibber, produced December 7, 1704, at Drury Lane, and printed in quarto in 1705. It treats of the straying of Sir Charles Easy from the paths of virtue and his final restoration to them through the patient forbearance of his excellent wife.

CARELESS LOVERS, The. A comedy by Edward Ravenscroft, produced at Dorset Garden in 1673 and published the same year. It is partly founded on *Monsieur de Pourceaugnac*, and contains an attack on Dryden's *Assignation*.

CARÊME, kȧ'râm', Marie Antoine (1784-1833). A famous French cook. He was born in Paris and became *chef de cuisine* to many celebrated persons, among whom was Talleyrand. While in his service, Carême played, in a way, a prominent rôle in the Congress of Vienna. He left several works on subjects connected with cookery, which include *Le pâtissier pittoresque* (1815); *Le pâtissier royal parisien* (1825); *Le maître d'hôtel français* in 2 vols.; and *Le cuisinier parisien*.

CARET, kȧ'râ' (Neo-Lat. *caretta*, from Sp. *careta*, pasteboard mask, dim. of *cara*, face, Gk. *κάρα*, *kara*, Skt. *siras*, head). A turtle. See Hawksbill.

CAREW, kȧ-rōō', George, Baron Carew of Clapton and Earl of Totnes (1555-1629). An English soldier and statesman. He was educated at Oxford and joined the army, holding an important command in the Irish wars against the Earl of Desmond. He filled several offices, among them that of Lord Justice of Ireland, and was an intimate friend of Sir Walter Raleigh. The powerful support that he gave to Lord Mountjoy enabled the latter to overcome the rebellious O'Neil, Earl of Tyrone, and his Spanish allies. For these services he was raised to the peerage and made a privy councilor, and in 1626 Charles I. created him Earl of Totnes. He had antiquarian tastes, and carefully preserved many manuscripts relating to Ireland. *Pacata Hibernia, or the History of the Late Wars in Ireland*, published after his death, is often ascribed to him, though it was written by Sir Thomas Stafford from Carew's papers.

CAREW, Richard (1555-1620). An English poet and antiquarian. While a student at Oxford, when only fourteen, he was chosen to dispute extemporaneously with Sir Philip Sidney, in the presence of an audience of noblemen. He was a member of Parliament, high sheriff of Cornwall, and the author of a *Surrey* (1602) of that county, a work that enjoyed a great reputation, and still has considerable value. He translated, from the Italian, the first five cantos of Tasso's *Jerusalem Delivered* and left a manuscript volume of poems.

CAREW, Thomas (1598-1638). An English poet. Of his life very little is known. He was a son of Sir Matthew Carew, of Middle-Littleton, Worcestershire, a master in Chancery, and was born probably in 1598. From Westminster School he went to Corpus Christi College, Oxford, but left about 1615, without a degree. "Afterwards," says Anthony Wood, "improving his parts by traveling and conversation with ingenious men in the metropolis, he became reckoned among the chiefest of his time for delicacy of wit and poetic fancy. About which time, being taken into the Royal Court for his most admirable ingenuity, he was made Gentleman of the Privy-Chamber, and Sewer in Ordinary to King Charles I." The King bestowed on him the royal domain of Sunning Hill, a part of Windsor Forest. Carew died, it would seem, early in 1638. He was the first of a group of lyrists, often classed as Cavalier poets, to the making of whom two influences contributed: the Elizabethan lyrists, especially Ben Jonson, and the pretty conceits of Dr. Donne. Carew's theme is love, which is treated with great frankness and with a luxuriant imagination. His verses are often very sweet and beautiful. He published, in 1634, a masque entitled *Cœlum Britannicum*; but his poems did not appear until 1640, some time after his death. Recent editions are by Hazlitt, for the Roxburghe Library (London, 1870); by Ebsworth (London, 1893); and by Vincent for the Muses Library (London, 1899). The last-named editor would identify the subject of this sketch with the Thomas Carew who entered Merton College, Oxford, in 1608, at the age of thirteen, and received the degree of B.A. in 1611. He also argues for 1639 as date of death.

CA'REX. See Cyperaceæ.

CA'REY, Henry (1692-1743). An English humorous poet and musician, born in London. He was a reputed son of George Saville, the famous Marquis of Halifax. After studying music under Linnert, Roseingrave, and Geminiani, he taught for a living, and wrote a number of musical dramas and ballad operas. He was the author of the libretto of *The Dragon of Wantley*, music by Lampe (London, October 26, 1737), and he also published six cantatas (1732), and *The Musical Century, or a Hundred English Ballads* (1737; 3d ed., 1743). Some of his *Poems* (1729) were highly praised by Addison. His name will be remembered for his ballad, "Sally in Our Alley." He died in London. His son, George Saville Carey (1743-1807), poet and dramatist, endeavored to establish his father's claim to the composition of "God Save the King" (q.v.), but the question is still undecided. Carey's granddaughter, Anne, was the mother of Edmund Kean, the tragedian.

CAREY, Henry Charles (1793-1879). An American economist, born in Philadelphia. In 1836 he published an essay on the *Rate of Wages*, which was expanded into the *Principles of Political Economy* (1837-40). The value of this work may be estimated from the fact that no less an authority than Frédéric Bastiat copied its leading ideas. It was translated into Italian and Swedish, and favorably noticed in all the important politico-economic journals of Europe. In 1838 Carey published *The Credit System of France, Great Britain, and the United States;* and in 1848, *The Past, the Present, and the Future*, a work marked by great vigor and originality. In 1853 appeared the *Letters on the International Copyright;* in 1858, *Principles of Social Science;* in 1867, *Review of the Decade 1857-67;* and in 1873, *The Unity of Law*. Carey was originally a free-trader, but later became a foremost champion of protection. He held that though free trade might be the ideal toward which we should tend, a period of protection is an indispensable stage in the progress toward it.

CAREY, Mathew (1760-1839). An Irish author and publisher. In consequence of publishing an address to the Irish Roman Catholics on their oppression by the penal code (about 1778), he was compelled to leave Ireland, but returned within a year, and established, in 1783, the *Volunteer's Journal*. His attacks upon Parliament and the Ministry caused his imprisonment in Newgate until the dissolution of Parliament. He arrived at Philadelphia by the aid of Lafayette, who sent him $400, and immediately started *The Pennsylvania Herald*, one of the first papers in the country to furnish accurate reports of legislative debates. In January, 1786, he fought a duel with Colonel Oswald, another editor, and was seriously wounded. He was subsequently connected with the *Columbian Magazine* and the *American Museum*. In 1791 he began trade as a bookseller, and, with his sons, built up a prosperous business. During the epidemic of yellow fever in 1793 he was active in the work of relief, and afterwards wrote a history of the disease. In 1793 he, with others, founded the Hibernian Society, and in 1796 he assisted Bishop White in establishing the first Sunday-school Society. Carey was a constant writer, and published a great number of essays on party politics, political economy, and social questions. Among his favorite ideas were internal improvements and a protective tariff. He died in Philadelphia. His son, Henry Charles Carey (q.v.), was one of the foremost American writers on political economy.

CAREY, Rosa Nouchette. An English novelist, born and educated in London, and now residing at East Putney. Beginning in 1868, she produced a large number of wholesome if not brilliant novels. Various fashions in novel-writing have come and gone, but she has held throughout to a simple and unaffected chronicle of commonplace folk. Of her work a good specimen is *Other People's Lives* (1897), a collection of short stories. Others are *Nellie's Memories* (1868): *Robert Ord's Atonement* (1873): *Wooed and Married* (1875): *Only the Governess* (1888): *Mrs. Romney* (1894): *My Lady Frivol* (1899); *Life's Trivial Round* (1900).

CAREY, William (1761-1834). An English Baptist missionary and Orientalist, born near Northampton, England. At the age of fourteen he was apprenticed to a shoemaker, but in 1786 was chosen minister of a Baptist congregation at Moulton, and in 1789 at Leicester. While preaching, he studied Greek, Latin, and Hebrew by himself, and in 1793 was sent as first Baptist missionary to India by the Baptist Missionary Society, which he had helped to organize. At first his financial support from home was so meagre that he had to accept employment as superintendent of an indigo factory. Nevertheless, he established a church near the factory at Maldah, and preached in the language of the natives. Five years later he removed to Serampur, a Danish colony. Under his direction this mission had up to 1832 issued about 200,000 Bibles, or portions thereof, in about forty Oriental languages or dialects, besides a great number of tracts and other religious works in various languages. A great proportion of the actual literary labor involved in these undertakings was performed by Carey himself, whose Sanskrit and other Oriental grammars and dictionaries are highly regarded by English scholars. He was professor of Oriental languages at Fort William College, Calcutta, from 1800 to 1830. For his biography consult: Eustace Carey (London, 1836), and George Smith (London, 1885).

CARGILL, kär′gĭl, Donald (c.1619-81). A Scottish covenanting preacher. He was educated at Aberdeen and Saint Andrews, and in 1655 was appointed to a church in Glasgow. He pronounced the restoration of Charles II. a public calamity, and for this he was deprived of his church and banished beyond the Tay. He was wounded in the battle of Bothwell, but made his escape; soon joined Richard Cameron in publishing the Sanquhar declaration, and boldly excommunicated Charles II., the Duke of York, and various high officials. He was soon afterwards arrested and beheaded in Edinburgh.

CARGO (Sp., burden, Fr. *charge*, from Med. Lat. *carricare*, to load a car, from Lat. *carrus*, car). A general term for all the merchandise carried on board a trading-ship. Sometimes it is applied also to the invoice of the cargo. The term *deck-cargo* is given to the commodities on deck, which are not usually included in the policy of insurance. For the security of the customs revenue, the master of every coasting-vessel is bound to keep a *cargo-book* recording the name of the vessel, the name of the owner, the port of departure, the port of destination, the goods taken, the names of the shippers and consignees, the time of departure, and other particulars. The custom-house officers may demand to see this book at any time. The cargo of passenger-ships is placed in some degree under the control of the emigration officers by an act passed in 1852.

CAR'HART, Henry Smith (1844—). An American physicist and professor in the University of Michigan. He was born at Coeymans, N. Y., March 27, 1844, and graduated from Wesleyan University in 1869. He pursued graduate studies at Yale, Harvard, and Berlin, and after serving as professor at Northwestern University, was appointed to the faculty of the University of Michigan in 1886. Professor Carhart has devoted himself largely to the study of electricity, particularly the subject of standard cells and primary batteries, one of the best types of the former having been devised by him and known as the Carhart-Clark cell. Professor Carhart has been a delegate from the United States to several international electrical congresses, and in 1893 was president of the board of judges in the department of electricity at the World's Columbian Exposition in Chicago. He is the author of *Primary Batteries* (1891), a standard treatise on this subject; *University Physics* (1894-96); *Elements of Physics* (1895); and other text-books and treatises.

CARHEIL, kȧ'rȧ'y', Etienne de. A Jesuit missionary among the Huron and Iroquois Indians of Canada from about 1668 to about 1721. For many years he was stationed at Michilimackinac, as superior of the Indian mission there, but he met with little success, and in 1701 most of the converts he had made left him to live in the newly established settlement of Detroit.

CA'RIA (Lat., Gk. Καρία, *Karia*). In ancient geography, the southwesternmost country of Asia Minor, bounded on the north by Lydia, on the east by Phrygia, on the southeast by Lycia, and on the west and southwest by the Mediterranean. Before the Macedonian conquest, Caria was cut off from the sea on the west by Ionia, and on the southwest by the Dorian colonies. A large portion of what was Caria is mountainous. The chief ranges were called the Cadmian and the Latmian. The most important river was the Mæander, famous for its windings. Caria was, at an early date, governed by petty princes or kings; it afterwards became a part of the Persian Empire, the former princes continuing to rule as satraps; and it subsequently came into the hands of the Macedonian kings of Egypt; and finally, with the rest of Asia, into those of the Romans. Among the chief towns were Cnidus, Halicarnassus, and Miletus. In the early history of the Ægean lands, the Carians are frequently mentioned, and the Greek writers seem to have believed that they were of the same race as the pre-Hellenic inhabitants of Attica and some of the islands. Many modern ethnologists also hold that the Carians were the remnant of the early population of the Ægean.

CARIACO, kȧ-ryä'kô. A seaport of Venezuela, situated 5 miles from the head of the Gulf of Cariago, 40 miles east of Cumaná (Map: Venezuela, E 1). It is the centre of a fertile district and has considerable coastwise trade. The gulf is very well sheltered, being open only to the westward. Cariaco was founded about 1600. Population, about 7000.

ÇARIAMA, sä'rē-ä'mȧ (Brazilian), or Seriema. A bird, *Cariama cristata*, allied to the cranes, but also resembling certain raptorial birds, and now generally ranked in a separate family, placed near the cranes and bustards. It is a native of Guiana, Brazil, and Paraguay, inhabiting open plains and the outskirts of forests, where it feeds chiefly on serpents, lizards, and insects. It is larger than the common heron; the plumage is brown, finely waved with darker brown, whitish on the lower parts. When pursued, the cariama seeks safety by running and does not readily attempt to use its wings. Its voice resembles that of a young turkey. It is much esteemed for the table, and is sometimes reared in a domesticated state. W. H. Hudson, the Argentine naturalist, considers it related to one of the great extinct birds of Patagonia, *Phororachos inflatus*, as closely as armadillos are related to Glyptodon. Consult *Proceedings Zoological Society of London* for 1889 and 1899. See Plate of Cranes, etc.

CAR'IB (West Indian, valiant man). A predatory and warlike people from whom the Cariban stock (q.v.) takes its name, formerly occupying most of the Lesser Antilles, by conquest or expulsion of the original Arawakan tribes. They had come from the southern mainland, being expert seamen. Like nearly all the tribes of this stock, they were distinguished for ferocity and cruelty, and were also addicted to cannibalism, the very word *cannibal* being a derivative from their tribal name. To put an end to the chronic disturbances occasioned by their presence, the English Government, in 1796, deported almost all the members of the tribe from Dominica and Saint Vincent to the island of Ruatan on the coast of Honduras, whence they have since spread over the neighboring mainland to the number of several thousand. From admixture with the negroes, a part of them are distinguished as Black Caribs.

CAR'IBAN STOCK. One of the most important linguistic stocks of South America, its tribes holding at the time of the discovery nearly the whole coast and midland region of Venezuela and British Guiana, including the lower Orinoco, together with the Lesser Antilles. Everywhere they were distinguished as a warlike race, the terror of their weaker neighbors, who were steadily retiring before them. In spite of their exceptional cruelty, they are described as "the strongest, handsomest, and most intelligent" of all the natives of that portion of the continent. They were expert boatmen, making use of the sail, a thing unknown among the other tribes, and in fleets sometimes numbering 100 canoes were accustomed to ascend the Orinoco, destroying everything before them. They were partly agricultural, and made excellent pottery. The present distribution of the principal Cariban tribes is as follows: On the river Guapore in Mato Grosso Province, Brazil, are the Palmellas, the most southerly members of the stock. The Bakairis and the Nahuquas dwell on the upper Xingu. In Brazilian Guiana are the Apotos and Waywai; in French Guiana, the Roucouyennes and Galibis; in Dutch Guiana, the Kalinas; in British Guiana, the Mucusi; and in Venezuela, the Makirifares and Motilones. The modern Caribs differ from the ancient Caribs of the Antilles in their more peaceful mode of life, the absence of cannibalism, and a less highly developed system of social relations. In place of the communal dwelling which formerly prevailed among them, each family at present occupies a separate house, sometimes built on piles as a safeguard against flood. They have a ceremonial religion and practice the couvade (q.v.). Their favorite weapon is a battle-axe of polished stone.

CAR′IBBE′AN SEA. A portion of the North Atlantic, bordered on the south by Central America, Colombia, and Venezuela, on the west by Central America and Yucatan, and partially inclosed from the ocean on the north and east by the island loop of the Greater and Lesser Antilles. It communicates at its northwestern extremity with the Gulf of Mexico by the Yucatan Channel—a passage 120 miles wide between Cuba and the Peninsula of Yucatan. The South American coast of the Caribbean Sea is diversified by the gulfs of Paria, Cariaco, Triste, Venezuela, and Darien, while on the western coast there are the larger embayments of the Mosquito Gulf and the Gulf of Honduras. The Gulf of Venezuela, between the Goajira Peninsula in Colombia and the Paraguana Peninsula in Venezuela, connects by means of a shallow channel with the lake of Maracaibo, the basin of which is the most prominent indentation on the northern coast of South America. Although the Caribbean is a partially inclosed sea, and lies on the border of a great land mass, it occupies a very deep depression. With the exception of a narrow shelf along the Venezuelan coast and a bank that reaches from Jamaica to Honduras and Nicaragua, the entire basin exceeds 6000 feet in depth and a large portion is more than 12,000 feet. Extreme depths exceeding 16,000 feet have been found off the south coast of Cuba, and between Haiti and Venezuela. The waters of the Caribbean Sea are influenced in their circulation by oceanic currents, and particularly by the north equatorial current, which enters the sea from the southeast. There is also a marked current in the northern part, which passes through the Yucatan Channel into the Gulf of Mexico. The Caribbean Sea receives the drainage of a great portion of Central America, but only an inconsiderable portion of South America, as the Andean Cordillera of Colombia and Venezuela turns the drainage of these countries toward the Orinoco, which enters the Atlantic. The islands of the Caribbean are grouped along the South American coast and along the bank from Jamaica to Honduras. They are small and unimportant.

CAR′IBBEE BARK. See Exostemma.

CARIBBEE ISLANDS. A name sometimes given to the Lesser Antilles. See Antilles.

CARIBE, kȧ-rē′bā (Sp., Portug., from West Indian *carib*, valiant man). Any of several voracious serrasalmonine fresh-water fishes of South America, often of strange form and distinguished by having the belly serrated with sharp spines. The best known is the piraya (*Serrasalmo piraya*). Gunther (*Introduction to the Study of Fishes*, Edinburgh, 1880) says that though most are of small size, their voracity, fearlessness, and number render them a perfect pest in many rivers of tropical America. "In all the teeth are strong, short, sharp, sometimes lobed incisors, arranged in one or more series; by means of them they cut off a mouthful of flesh as with a pair of scissors, and any animal falling into the water where these fishes abound is immediately attacked and cut to pieces in an incredibly short time. They assail persons entering the water, inflicting dangerous wounds before the victims are able to make their escape. In some localities it is scarcely possible to catch fishes with the hook and line, as the fish hooked is . . . torn to pieces before it can be withdrawn from the water. The caribes themselves are rarely hooked, as they snap the hook or cut the line. The smell of blood is said to attract at once thousands of these fishes to the spot."

CARIBOU, kä′rĭ-bōō. A lake in Maine. See Chesuncook Lakes.

CARIBOU, kăr′ĭ-bōō (Canadian Fr., Amer. Indian). A French-Canadian name for the American forms of the reindeer, regarded by most zoologists as varieties of the European *Rangifer tarandus*. (See Reindeer.) Two pretty distinct forms exist, the common woodland variety (*Rangifer caribou*) and the barren-ground variety (*Rangifer Grœnlandicus*). The former is found throughout the forested region of northern America, where it formerly extended as far south as Connecticut, Pennsylvania, and Colorado, but since the middle of the Nineteenth Century extends south of Canada only in Maine, Michigan, and the Rocky Mountains. (See Plate Deer of North America.) It ranges the woods and swamps, is especially numerous in Newfoundland, Labrador, and British Columbia; and in winter gathers into herds of several hundred, which are able to traverse the snow upon their broad and hairy hoofs, and find an abundance of food in leaves and berries (especially cranberries), lichens, etc. In the summer they move about a great deal to escape the flies and at all seasons are the principal dependence of many Indians. Three local varieties of this caribou are noted, so variable is it in size and color; but it presents little distinction from the Old World reindeer except in the antlers, where the brow-tines are very unequally developed.

The barren-ground caribou is a smaller and paler form, with disproportionately large antlers, which occupies the open country north of the tree-growth and the coastal valleys of Greenland, to an extreme distance north. It is named *Rangifer Grœnlandicus*, and is regarded as having a better claim to independent specific rank than any other American form. It is to be found in vast herds in the desolate plains between Great Slave Lake and Hudson Bay, where it subsists upon lichens, and migrates southward in fall to the margin of the forest, returning northward each spring. The Indians and Eskimo gather about these migrations and obtain a winter's supply of meat and skins. Consult: Shields, *Big Game of North America* (Chicago, 1890); Roosevelt (*et al.*), *The Deer Family* (New York, 1902).

CAR′ICA. See Papaw.

CARICATURE (Fr., It. *caricatura*, from Med. Lat. *caricare*, to overload, exaggerate, from Lat. *carrus*, car). A representation, descriptive or pictorial, in which the peculiarities or natural characteristics of an individual or class are exaggerated, so as to make the object ridiculous. In this article the term is used in its usual significance as applied to the plastic and graphic arts, especially the latter. The two principal kinds of caricature are moral, directed against the habits and customs of individuals and of society, and political, directed against corruption and bad government in the State. To be good, a caricature must possess real traits of the original, exaggerated in a ridiculous sense, but easy to recognize. The artist should have a good sense of form, a ready pencil, and keen observation. To this must be added a considerable knowledge of human nature, and of the influences of the passions, habits of life, and modes of thought upon mankind. As caricature does not enter into very high and serious art, neither should the medium or method employed be too dignified or heavy. The use of oil colors might be out of place here, and a certain inattention to studied and accurate drawing is permissible. The touch should be light and skillful, and the medium best employed is perhaps pen or pencil. Caricature probably is as old as man's ability to express himself in the graphic arts. It is said to have existed in Assyria, and certain grotesque figures in the Egyptian papyri are probably caricatures. Though averse to distorting the human figure, the Greeks caricatured their gods and heroes. On a Greek vase "Apollo Arriving at Delphi" is represented as a charlatan of the Greek theatre, and on another, Achilles, intoxicated, is borne on the shoulders of Ajax. We know from the statements of Horace and Cicero that caricature was common in Rome. A fresco found at Gragnano represents Æneas, his father and his son, with dogs' heads and otherwise caricatured. Another like the preceding in the Museo Gregoriano, Rome, represents a philosopher as a pigmy preaching to a fox. Some of the designs called "Graffiti," found at Herculaneum and Pompeii, are caricatures. Such a design, found near the Palatine Hill, Rome, represents "Christ on the Cross," with an ass's head, adored by a believer, with the inscription, "Alexamenus, adore thy God."

The grotesque was a marked feature of the art of the Middle Ages, especially during the Gothic period. Caricatures abounded in the illuminations of manuscripts and in the thousands of statues which ornamented the church portals. Satan, Death, and other unpopular personages were much satirized, but the Church was by no means spared, the monks receiving an unusual share. The "Dance of Death" (q.v.) was a caricature, on a large scale, of Death dominating all classes of society.

The painters of the Renaissance frequently made use of caricatures. Those of Leonardo da Vinci, most wonderful drawings, were purely artistic, and without reference to morals or politics. Annibale Carracci used caricature as a weapon against the Naturalists when, in his picture of the Naples Museum, he portrayed Caravaggio, his great rival, as a dwarf with monkeys and parrot. The school of the Carracci produced a number of good caricaturists. Other distinguished Italians of the Seventeenth Century were Bacio del Bianco in Florence, and Pietro Bellotti in Venice; of the Eighteenth Century, the Roman artist Pierleone Ghezzi. In Germany, Hans Holbein's "Dance of Death" and his illustrations of Erasmus's *Praise of Folly* were caricatures of the highest artistic order, and Lucas Cranach's prints ridiculing the Pope and Catholicism were of the widest influence. The pictures of Brauwer, Teniers, and Ostade, though high works of art, are real caricatures of peasant life.

The invention of the printing-press gave to caricature a new power, but it was hindered from using this power by the lack of freedom of the press. In France, each party made use of caricature during the wars of the Reformation, and the well-known "Songes Drôlatiques," attributed to Rabelais, ridiculed both parties. A really great caricaturist of the Seventeenth Century was Callot, but he devoted himself to satirizing general types. Under Louis XIII. and his successor, caricature was active, especially at the close of the reign of Louis XIV., who was much annoyed by the Dutch artist Romain de Hoghe, a pupil of Callot, in the service of William of Orange. The caricaturists lashed, with a merciless hand, the immoralities of Louis XV., and the clerical régime. During the Revolution caricature became a means of political propaganda, and was especially used by the Republicans. Each event of the Revolution was lauded or attacked, the King and Queen being especially noticed. Napoleon I. confined caricature to manners and customs, but the English lampooned him all the more for the repression in France. After the Restoration the returned aristocracy and the clerical tendencies of the Kings formed excellent butts of ridicule, even such artists as Delacroix and Decamps taking part. The Revolution of 1830 brought greater liberty of the press and, aided by the invention of lithography, caricature flourished as never before. In that year Charles Philippon founded *La Caricature*, which was followed by *Charivari* and the *Journal pour Rire*. Louis Philippe was the most caricatured of all French monarchs, his pear-shaped head forming a peculiarly tempting butt of ridicule. A brilliant group of caricaturists arose, who were of great importance in the history of art, and did much to bring art back from classicism to real life. Honoré Daumier, in particular, lashed the Chamber of Deputies, the Peers, and the Kings, as he afterwards ridiculed Napoleon III. Among other artists were Carle Vernet, Gavarni, Henri Monnier, and Cham, probably the most important group of caricaturists the world has seen. Under Napoleon political caricature was confined to external politics, but the Third Republic brought liberty, and saw the development of such talents as Grévin, Wilette, Caran d'Ache, Pille, Boutet de Monvel, and others.

The first great English caricaturist was Hogarth (1697-1764), who satirized social vice with realism and force. Political caricature began with the Ministry of Walpole in 1721, but the artists were mainly foreign. In the latter half of the century an important group of native artists arose, chief among whom were James Gillray and Thomas Rawlinson. They reflected political sentiments in the minutest manner, and are, in fact, a valuable source of history for the period. Their work is, however, rather coarse, in comparison with that of the present. Chief among the artists of the early half of the Nineteenth Century were George Cruikshank, for "moral comedies," and the brothers John and Richard Doyle for political caricature. In 1841 was founded *Punch, or the London Charivari*, in which the more refined modern caricature of Leech and Tenniel flourished. The most important of its contributors was Du Maurier, the refined portrayer of English aristocratic society.

In Germany political caricature began with the Congress of Vienna, but was restrained by the lack of freedom of the press. The *Fliegende Blätter*, a humorous but non-political journal, was founded in Munich in 1844. It employed such artists as Harburger, Oberländer, and Meggendorfer, and the standard of work in its pages is very high. With the Revolution of 1848 the Berlin *Kladderadatsch* began its activity, and soon became famous by its political caricatures. Those on Bismarck, by Wilhelm Scholz, have become historic. The *Düsseldorfer Monatshefte* was carried on by artists of the Düsseldorf school. Vienna has a number of comic journals, chief among which are *Kikeriki* and the *Figaro*, for which Wilhelm Busch and Schliessmann have done good work.

The greatest Spanish caricaturist was undoubtedly Goya (1746-1828), whose masterly satirical talent, in both painting and print, was directed against the foibles and vices of society. Political caricature exists, at the present time, in nearly all European countries, and it has become a mighty force in politics. In the United States its power was shown during the Civil War, and especially in Thomas Nast's cartoons stigmatizing the Tweed Ring in New York. *Puck*, *Life*, and other comic papers are devoted mainly to caricature, and weekly journals, like *Harper's* and *Leslie's*, exercise, through it, a great influence. Of late years the newspapers have made increasing use of caricature as a means of influencing public opinion. Among the chief American caricaturists are F. B. Opper, Homer Davenport, W. A. Rogers, C. G. Bush, and E. Kemble.

BIBLIOGRAPHY. The chief authority on Caricature is Champfleury, *Histoire générale de la caricature* (5 vols., Paris, 1865-80), with supplementary volume in 1885. See also Wright, *History of Caricature and Grotesque* (London, 1875); Flögel, *Geschichte des Grotesk-Komischen* (Liegnitz, 1778; new edition by Eberling, Leipzig, 1886); Parton, *Caricature and Other Comic Arts* (London, 1877); Everitt, *English Caricaturists of the Nineteenth Century* (London, 1886); Grand Carteret, *Les mœurs et la caricature en Allemagne, en Autriche et en Suisse* (Paris, 1885); *Les mœurs et la caricature en France* (Paris, 1888). The last-named author has also published, in recent years, a large number of collective works of caricatures. See also the special articles on the different artists mentioned.

CARIES, kā'rĭ-ēz (Lat., rottenness). A disease of bone analogous to the ulceration of soft tissues. It is characterized by a gradual loss of substance, suppuration occurring, and the bone breaking down and coming away in granular detritus. This finds its way to the surface, and an opening occurs through which the purulent fluid discharges, as the bone is eroded. Caries may attack any bone, but it usually selects the vertebræ, bones of the wrist and foot, and the articular ends of long bones. In the case of spinal caries the disintegrating process attacks the cartilaginous disks between the vertebræ as well as the bone, and the column is destroyed, curvature resulting. Frequently the pus and detritus find their way to a point in the groin, passing down between the sheaths of various muscles, before opening at the surface and discharging. To this terrible disease most deformities not congenital are owing. The carious vertebræ yield under the weight of the trunk, and the spine curves forward or to one side. In the joint-ends of bones, the part enlarges, the cartilages become affected, matter forms, and amputation of the limb or excision of the joint is frequently necessary to save the patient's life. Too often the disease recurs with night-sweats, hectic, and death. The causes of caries are constitutional or traumatic. Scrofula, syphilis, or excessive use of mercury may be the cause. If affecting a small bone, the latter may be entirely removed; and if the disease is strictly limited to the ends of the bones forming a joint, these may be excised. Carious places may be scraped out or gouged out by the rongeur in some instances. Amputation may be necessary. Constitutional treatment to improve assimilation and nutrition, and combat any underlying cachexia, must be employed.

CARIES OF THE TEETH. This depends either on an original faulty formation of the substance of the teeth, or microbial infection, generally due to neglect. The carious surface should in all cases be removed, and, as a substitute for the lost substance, gold or some other substance should be stuffed into the cavity. If the pulp be exposed, and pain be present, the cavity may be filled with cotton wet with oil of cloves, tincture of capsicum, or a strong solution of cocaine, or chloroform, for temporary relief. Ten grains of tannin and five grains of gum mastic dissolved in a dram of ether, applied after the cavity is wiped very dry, will often control pain for many hours.

CARIGARA, kä'rē-gä'rä. A town of Leyte, Philippines, 32 miles from Tacloban. It is situated on a bayou on the northern coast of the island, and is a landing-place for steamers from Manila. Population, in 1898, 13,732.

CARIGNANO, kä'rē-nyä'nō. A city in north Italy, in a fertile but damp locality on the left bank of the Po, 11 miles south of Turin (Map: Italy, B 3). The Church of San Giovanni Battista is the work of Benedetto Alfieri. The Church of Santa Maria delle Grazie contains a monument to Bianca Palæologus, wife of Duke Charles I. of Savoy, at whose Court the Chevalier Bayard received his knightly training. After the death, in 1418, of Prince Ludovico of Acaia, Carignano fell to the dukes of Savoy, and was given by Charles Emmanuel I. as a principality to his youngest son Tommaso, who was an ancestor of the present King of Italy. The principal occupations of the people of Carignano are the culture and manufacture of silk. Population, in 1901 (commune), 7129.

CAR'ILLON, *Fr. pron.* kä'rē'yôɴ'. See CHIMES.

CARIMATA, kä'rē-mä'tȧ, or **KARIMATA**. A name applied to the strait between Borneo and Billiton in the Dutch East Indies; also to a cluster of isles in the same passage; and lastly to the principal member of the group, whose highest point, a peak of 2000 feet, is in latitude 1° 36′ S. and longitude 108° 54′ E. (Map: East Indies, C 5).

CAR'INA'TÆ (Neo-Lat., nom. pl. of Lat. *carinatus*, keel-shaped, from *carina*, keel). One of the two great subclasses of living birds, the other being Ratitæ, distinguished by the presence of a more or less well-developed 'keel' on the sternum. Associated with this character is the condition of the wings, which are well formed and almost always fitted for flight. The Carinatæ include more than 11,500 known species of birds. See BIRDS.

CARINI, kä-rē′nê. A city in Sicily, situated on a steep hill, 4 miles from the sea, in a country rich in corn and wine, 17 miles west of Palermo (Map: Italy, H 9). The castle was built by the Chiaramonti, in the Fourteenth Century. In the vicinity are caves in which animal fossils are found. The Sicilian Revolutionists were defeated here, April 18, 1860, by the Bourbon troops. North of the town, picturesquely situated by the sea, was the ancient Hyccara, from which the Athenians carried off the twelve-year-old Laïs, who grew up to be so famous a courtesan. Population, in 1881 (commune), 12,037; in 1901, 13,931.

CARINO, kä-rē′nô. (1) A villainous man of the Court and city in Guarini's *Pastor Fido*. (2) The father of Zenocia (also spelled Charino), in Fletcher's *Custom of the Country*.

CARIN′THIA (Ger. *Kärnten*, from the Celtic tribe of *Carni*). A crownland and duchy of Austria-Hungary, bounded by Salzburg and Styria on the north, Styria on the east, Italy, Görz and Gradisca, and Carniola on the south, and Tyrol on the west (Map: Austria, C 3). Its area is about 4000 square miles.

Carinthia is a very mountainous country. Its northern part is traversed from west to east by a portion of the Hohe Tauern and the Styrian Alps, while its eastern end is covered by other Alpine ranges. South of the Drave rise the Carnic Alps and the Karawanken, a continuation of the former chain. In the interior there is the important valley of the Drave, which separates the two mountain systems of the north and south. There are a number of large and very attractive lakes; among them the Wörther, Millstätter, and the Weissen. There are also some valuable mineral springs. The climate is not unlike that of Tyrol.

INDUSTRIES. Owing to its mountainous surface, only a small part of the land of Carinthia is adapted for tillage, the larger part of the productive land being covered with forests or used for pasture. Large quantities of timber are floated down the Drave. Nearly all the surface of the country has been made remunerative. Rye, oats, wheat, buckwheat, and clover-hay are leading crops. The raising of live stock is carried on extensively in the mountain ranges, and the horses of Carinthia are highly valued. The mountains are rich in minerals, especially lead, of which Carinthia is considered one of the chief producers in Europe. Iron is also mined on a large scale, and there are mines of coal and zinc. The total value of the mining product in 1898 was about $835,000, of which $380,000 was lead. The chief manufacturing industry is the production of iron and steel. Bessemer steel rails, wire, wire nails, and bar iron are produced in great quantities. Some machinery, firearms, textiles, leather goods, cement, and wood-pulp are exported. Considering the configuration of its surface, Carinthia is well provided with roads; also waterways, among which the most important is the Drave. Klagenfurt is the centre of the railway lines, of which there are about 300 miles, or 2.62 per cent. of the total mileage of Austria.

GOVERNMENT. The Diet of Carinthia consists of 37 members, consisting of the archbishop of Gurk, ten representatives of the landed aristocracy, nine representatives of the towns, three representatives of the chambers of commerce and industry of Klagenfurt, and fourteen representatives of the rural communities. In the Lower House of the Austrian Reichsrat, Carinthia is represented by ten members. For administrative purposes, Carinthia is divided into seven counties and the city of Klagenfurt. There are nearly four hundred elementary schools (including 285 German schools), with a total attendance of about 54,000, constituting over 95 per cent. of the total school population.

The population of Carinthia in 1900 was 367,344, showing an increase of 1.8 per cent. since 1890. About 70 per cent. of the people are Germans, and 30 per cent. Slovenes. Ninety-five per cent. belong to the Roman Catholic Church, while the remainder are Protestants. The capital, Klagenfurt (q.v.), has a population of about 25,000.

Under the Roman Empire, Carinthia formed part of the Province of Noricum. Its ancient inhabitants were the Carni, a Celtic people, who, during the period of the migrations, were overwhelmed by a race of Slavs. The Kingdom of Carantania, which the invaders founded under the leadership of Samo, an energetic Frank, proved of short duration, and the region was annexed by Charlemagne to the Frankish Empire. After his death it passed to Louis the German, and was ruled for five hundred years by dukes of different lines, until it came into the possession of the archdukes of Austria in 1335. Upper Carinthia was held by the French from 1809 to 1813.

Consult: Ankershofen, *Geschichte des Herzogtums Kärnten* (Klagenfurt, 1850); Schlechter, *Alte Geschichte des Obergailthales in Kärnten* (Vienna, 1885); *Kärnten und Krain* (Vienna, 1891).

CARI′NUS, MARCUS AURELIUS (? -285). Emperor of Rome from 283 to 285. He was the son of the Emperor Carus. Made Cæsar (heir presumptive) in 282, along with his brother, Numerianus, he was associated in the Empire in August, 283, and reigned alone after the murder of his father. When Diocletian seized the chief power in Mœsia, Carinus led his army against him, but was killed by his own soldiers in March or April, 285.

CARIPE, kä-rē′pâ. A town of Venezuela, situated in a fertile valley of the same name, 50 miles southeast of Cumaná (Map: Venezuela, E 1). It contains an old church formerly belonging to the Capuchin monastery, since ruined. The valley is noted for a cavern inhabited by the remarkable bird called guacharo (q.v.). Population of town and valley, about 5000.

CARIRI, kä-rē′rê, or KIRIRI. A former powerful tribe residing on San Francisco River, in the Province of Bahia, eastern Brazil. They were one of the most progressive of the Brazilian tribes, cultivating the ground and excelling in weaving. In 1699 the Jesuit Mamiani published a grammar of their language, which appears to constitute a distinct stock. They are now reduced to perhaps 500 souls.

CARISBROOKE, kär'is-bruk. A village in the Isle of Wight, adjoining Newport (Map: England, E 6), which was formerly the 'new port' of Carisbrooke. It is chiefly noted for its castle, which is supposed to have been built by the Saxons. It was enlarged in the Eleventh Century by the first Lord of Wight, was captured by Stephen in 1136, and in the time of Richard II. successfully resisted attacks by the French. During the reign of Elizabeth it was enlarged and the present outer works added. It was in this castle that Charles I. took refuge in November, 1647, and was imprisoned for thirteen months. After his execution his two youngest children were confined in the castle, and Princess Elizabeth died there, nineteen months later. The remains of the castle are still extensive. Near by are the ruins of a Cistercian priory founded in the Twelfth Century, and vestiges of a Roman villa. The population of Carisbrooke is about 8200. Consult Beattie, "Carisbrooke Castle and its Ancient Lords," in *British Archæological Journal*, Vol. X. (London, 1855).

CARISSIMI, kä-rēs'sē-mē, GIACOMO (1604-74). An Italian church composer. He was born at Marino, where he acquired his first knowledge of music. In 1624-28 he was kapellmeister at Assisi, and from that time until his death at the Church of Saint Apollinaris in Rome. His works mark a turning point from the polyphonic style of the Palestrina school to the modern dramatic method. In his search for expression he produced a freer recitative that ideally fitted the accents of ordinary speech, and he gave prominence to the instrumental accompaniment. He was the creator of the chamber cantata, and added an instrumental accompaniment to the *motet*. His style is more animated and graceful than that of his predecessors. His numerous compositions included cantatas, oratorios, masses, motets, and even music of a comic character. The greater part of them has perished, but enough has been preserved in various libraries (chiefly in manuscript) to entitle Carissimi to a rank among the most important figures in the history of music. Among his published works were the following: "Jephta," "Judicium Salomonis," "Baltazar," "Jonas" (oratorios strikingly foreshadowing Handel), in Vol. II. of Chrysander's *Denkmäler der Tonkunst* (1856); motets (1664 and 1667); masses (1663 and 1667); *Arie da camera* (1667); and *Ars Cantandi* (3d ed., 1696). As a teacher Carissimi was greatly esteemed, Alessandro Scarlatti, Buononcini, and Cesti being the most noted of his pupils.

CAR'KER, JAMES. The unscrupulous business manager of Mr. Dombey in Dickens's novel *Dombey and Son*. He is a sly, smooth schemer, with gleaming white teeth. Edith, his employer's second wife, agrees to elope with him, to revenge herself on her husband; but she spurns him in the moment of his expected triumph. He is crushed by a railroad train in trying to escape from the man whom he has so deeply wronged.

CARL, PHILIPP (1837-91). A German physicist, born at Neustadt, Middle Franconia. He studied the exact sciences in Munich, and spent several years in astrophysical researches at the observatory of that city. In 1865 he established, and for several years thereafter directed, a workshop for the manufacture of mathematical instruments. In that year he established also the *Repertorium fur Experimentalphysik*, which he edited until 1882. His published works include: *Die Principien der astronomischen Instrumentenkunde* (1863), and *Repertorium der Kometenastronomie* (1864).

CARLÉN, kär-lān', EMILIA SMITH FLYGARE (1807-92). A Swedish novelist, noted for her stories of seafaring folk, fishermen, and smugglers, with whom as a child she had come in frequent contact, through the trading voyages of her father, Rutger Smith. She was born at Strömstad and married, at the age of twenty, the physician A. Flygare. After his death, in 1833, she decided to devote herself to literature. Her first novel, *Waldemar Klein* (1838), was followed by her marriage (1841) to Johan Gabriel Carlén, a lawyer and poet of Stockholm. Popular tales followed in rapid succession until 1852, when she lost a son and wrote no more until 1858. With her husband's death in 1875 her literary activity ceased altogether, although until that time her salon had been the literary centre of the capital. She founded charitable endowments in aid of students and of teachers, and of fishermen and their widows. Of her works (30 vols.), many are translated into German, French, and English. Characteristic are *Gustav Lindorm* (1839); *The Rose of Tistelön* (1842); and *The Maiden's Tower* (1848). She wrote, also, a bright autobiography, *Reminiscences of Swedish Literary Life* (1878).

CARLES, kär'lās. A town of Panay, Philippines, in the District of Concepción, situated at the northeastern extremity of the island. Population, in 1898, 10,300.

CARLETON, kärl'ton. A suburb of Saint John (q.v.), New Brunswick, Canada (Map: New Brunswick, C 4).

CARLETON, kärl'ton, Sir GUY, first Lord Dorchester (1724-1808). A British soldier and administrator. He served at Louisburg, Quebec, and Belle Isle, and was wounded in the siege of Havana in 1762. In 1766 he was appointed Lieutenant-Governor, and in 1775 Governor of Quebec Soon afterwards he took command of the British forces in Canada, successfully repelled the attack of Montgomery and Benedict Arnold in 1775-76, defeated Arnold on Lake Champlain, and captured Crown Point (1776). For these services he was raised to the rank of lieutenant-general. In 1777 he was superseded by Burgoyne. In 1782 he succeeded Sir Henry Clinton as commander-in-chief in America. Carleton remained in New York until after the treaty of peace had been signed. On his return home he was granted a pension of £1000 a year, and was created Baron Dorchester. In 1786 he again became Governor of Quebec, and was very popular as an administrator of that province. Under him Canada was divided into the provinces of Upper and Lower Canada. He returned to England in 1796.

CARLETON, HENRY GUY (1856—). An American journalist and dramatist. He is best known as a playwright, and among his principal dramas are *The Pembertons*, *Victor Durand*, *The Gilded Fool*, and *Ambition*. His tragedy *Memnon* (1881), based on an incident of Egyptian history, is a play of great strength, and contains many lines of exceptional beauty.

CARLETON, James Henry (1814-73). An American soldier, born at San Antonio, Texas. He took part in the so-called Aroostook War, arising over disputes concerning the northeastern frontier of the United States (1838-39). He also subsequently served in Kearny's expedition to the Rocky Mountains (1846). Later he served on the staff of General Wool, in Mexico, and distinguished himself at Buena Vista, where he was brevetted major. He was the organizer and commander of the 'California Column' of troops, which in the spring of 1862 undertook the march across the Yuma and Gila deserts to the Rio Grande. In April of that year he received a commission as brigadier-general of volunteers, and soon afterwards relieved General Canby as commander of the Department of New Mexico. In recognition of his distinguished services in that Territory, he was at the close of the war raised by brevet through all ranks in the regular army up to that of major-general. His principal publication is *The Battle of Buena Vista, with the Operations of the Army of Occupation for One Month* (1848).

CARLETON, Will (1845—). An American poet, noted for his ballads of domestic life, which have been very popular. He was born at Hudson, Mich., October 21, 1845. Soon after his graduation at Hillsdale, in 1869, he traveled widely as a lecturer in the Northern and Western States, Great Britain, and Canada. His first *Poems* appeared in 1871. These were followed by *Farm Ballads* (1873); *Farm Legends* (1875); *Young Folk's Centennial Rhymes* (1876); *Farm Festivals* (1881); *City Ballads* (1885); *City Festivals* (1892); *Rhymes of Our Planet* (1895). He was also for a time editor of *Everywhere*, an illustrated magazine.

CARLETON, William (1794-1869). An Irish novelist, born at Prillisk, Tyrone, Ireland. Bred and educated among the peasantry, he passed through the common sufferings and privations of Irish poverty. After receiving some scanty instruction in a hedge-school, he attended an academy at Glasslough. Subsequently a vague ambition led him to Dublin, where he arrived with only two shillings and ninepence in his pocket. He soon began writing, for a Dublin periodical, sketches of Irish life, which he published in 1830, under the title, *Traits and Stories of the Irish Peasantry*. Their freshness of style pleased the public, and won the favor of critics. A second series, issued in 1833, was also well received; and in 1839 he published *Fardorougha the Miser*, an experiment in the longer novel of Irish manners. This was followed by a series of tales (3 vols., 1841), mostly of pathetic interest, but including a very genial and humorous sketch of the *Misfortunes of Barney Branagan*, which proved a great favorite. In 1845 appeared *Valentine M'Clutchy*, a novel, half political and half religious in its tendency, defending the Irish Catholic priesthood, and advocating repeal of the union. Other narratives—*Rody the Rover* (1845); *The Black Prophet* (1847); and *The Tithe Proctor* (1849)—contain many proofs of the author's talents. *Willy Reilly* appeared in 1855, and *The Evil Eye* in 1860. Carleton is the true historian of the Irish people. Sharing in their qualities of mind and temperament, he had genuine sympathy with all their joys and sorrows, and a graphic pen to describe them. Consult *Traits and Stories*, edited by O'Donoghue (London and New York, 1896).

CARLETON COLLEGE (after W. Carleton, who gave it $50,000). A non-sectarian educational institution at Northfield, Minn., founded by Congregationalists in 1866. The college opened in 1870. It has well-equipped chemical, physical, and biological laboratories, and an unusually efficient astronomical department. In 1901 the value of the college buildings and grounds was estimated at $250,000, the productive funds amounted to about $250,000, and the library contained 17,000 volumes. At the same time the collegiate and preparatory faculty numbered 24, and there were 231 students in the college proper, 93 in the music schools, and 101 in the preparatory department. President, James W. Strong, D.D., LL.D.

CARLETON PLACE. A town in Lanark County, Ontario, Canada, on the Mississippi River and the Canadian Pacific Railroad, 28 miles from Ottawa (Map: Ontario, G 2). It contains large saw-mills, railway and other workshops. Population, in 1901, 4059.

CARLI, kär'lê, Giovanni Rinaldo, Count (1720-95). An Italian economist and antiquarian, born at Capo d'Istria. In his twenty-fourth year the Senate of Venice appointed him professor of astronomy and navigation there. In 1753 he was appointed president of the newly established Council of Commerce in Milan. Soon afterwards he published the first volume of his celebrated work on the coins of Italy, under the title, *Delle monete e dell' istituzione delle zecche d'Italia* (3 vols., 1754-60). In 1766 he published a pamphlet on the deterioration of coin in Milan. He also made a census of Milan, and wrote a pamphlet favoring a protective tariff, and a work entitled *Delle antichità italiche* (5 vols., 1788-91).

CARLILE', Richard (1790-1843). An English free-thinker, born at Ashburton. He was apprentice in a chemist's shop, worked as a journeyman tinman, and, through the reading of Paine's *Rights of Man*, became a Radical. He next sold about London a weekly called the *Black Dwarf*, printed and disposed of 25,000 copies of Southey's *Wat Tyler*, reprinted the *Parodies* of William Horne, and wrote, in imitation of them, *The Political Litany* (1817). For this he spent eighteen weeks in the King's Bench Prison. In 1818 he published Paine's works, which he followed by others of like character, and in 1819 was condemned to pay £1500 and be imprisoned in Dorchester jail for three years. Here he published the first twelve volumes of his periodical, *The Republican* (1819-26). A public subscription of £6000 was raised for the prosecution of his assistants, the Duke of Wellington heading the list; and his imprisonment was increased by three years, in lieu of the fines. Upon his release he edited a weekly, *The Gorgon*, and conducted public discussions in the Rotunda, Blackfriars Road. Subsequently he suffered something more than three years of additional imprisonment. He may be said to have done more than any other Englishman of his time for the freedom of the press.

CAR'LIN (probably dim. of *carl*, AS. *carl*, Icel., OHG. *karl*, Ger. *Kerl*, fellow, Eng. *churl*, otherwise explained as a corruption of Fr. *harlequin*, It. *arlequino*, harlequin). An inferior variety of pug dog. See PUG.

CAR'LINES, or **CAR'LINGS** (Fr. *carlingue*, Russ. *karlinsŭ*). In shipbuilding, small beams laid fore and aft, and resting upon the main or deck beams. These, with other pieces called *ledges*, laid at right angles to them, form a framework by which the deck is supported

CAR'LINGFORD, CHICHESTER SAMUEL FORTESCUE, Baron (1823-98). A British statesman, born at Glyde Farm, County Louth, Ireland. He graduated in 1845, at Christ Church, Oxford, and from 1847 to 1874 sat in Parliament for County Louth. He became a member of the Privy Council in 1864, and in the following year Chief Secretary for Ireland, succeeding Sir Robert Peel. This secretaryship he resumed under Gladstone's first administration, and in the preparation of the Land Bill of 1870 he rendered invaluable assistance. He became president of the Board of Trade in 1871, Lord Privy Seal in 1881, and in 1883 President of the Council. He rejected the Home Rule cause in 1886, and was thenceforth a Liberal Unionist. He published a pamphlet, *Christian Profession Not the Test of Citizenship* (1848).

CARLINI, kär-lē'nē, FRANCESCO (1783-1862). An Italian astronomer, born in Milan. He devoted himself to the study of astronomy, and during the last thirty years of his life acted as director of the astronomical observatory of his native town. His published works include: *Esposizione di un nuovo metodo di costruire le tavole astronomiche applicato alle tavole del sole* (1810), and *Nuove tavole de moti apparenti del sole* (1832).

CAR'LINVILLE. A city and county-seat of Macoupin County, Ill., 60 miles north by east of Saint Louis, Mo., on the Chicago and Alton and other railroads (Map: Illinois, B 4). It is the seat of Blackburn University (Presbyterian), opened in 1859, and contains a handsome county court-house. The city is an important centre for local trade, and has coal-mining interests. Settled in 1833, Carlinville was incorporated in 1865. The government is administered by a mayor, elected biennially, and a municipal council. Population, in 1890, 3293; in 1900, 3502.

CARLISLE, kär-līl' (Brit. *Caer Luel*, from *caer*, city, and *Luel*, connected with Irish *Lug*, name of a god, OHG. *lockōn*, to lure, Lett. *lúgt*, to pray: cf. the Lat. form, probably a translation, *Luguvallum*). A Parliamentary and municipal borough and an episcopal city, the capital of the County of Cumberland, England, 7 miles from Solway Firth, 300 miles north-northwest of London, 101 miles south of Edinburgh, and 60 miles west-southwest of Newcastle (Map: England, C 2). It stands on an eminence in a wide plain at the confluence of, and nearly surrounded by, the Eden, Caldew, and Petteril. The cathedral, a red freestone structure, was founded by William Rufus, and dedicated in 1101 by Henry I.; in 1133 it was made the cathedral church of the newly formed diocese. A great part of the original Norman building was destroyed by fire in 1292. Two-thirds of the fine Norman nave, originally 141 feet long, were destroyed by Cromwell: the portion that was left has long been used as a parish church. The choir is one of the finest in England, 138 feet long and 72 feet high, and consists of eight pointed arches. The east window, consisting of nine lights, is considered the finest decorated window in England. The tower is very low, rising but one story above the choir. The castle was founded in 1092, and is now used as barracks; the remains of the keep form a massive lofty tower, with a very deep well. Mary, Queen of Scots, was confined in the castle after the battle of Langside. In spite of its antiquity, Carlisle is a thoroughly modern town in its appearance and facilities. Many fine new streets and buildings have been recently constructed, and the city has gradually come into possession of all the quasi-public works. It owns its water and gas works, and since 1899 has operated an electric-light plant. Its markets and slaughter-houses are a profitable source of municipal revenue, and it maintains a library, a museum, and technical schools. It sends one member to Parliament. Seven railway lines enter Carlisle, which is connected by rail with the port of Silloth, 20 miles distant, where an extensive dock has been constructed on the Solway. The chief industries are the manufacture of cottons and calicoes, iron-works, and dyeing establishments. The salmon-fishing in the Eden is also of some importance. The United States has a resident consular agent. Population, in 1851, 26,310; in 1891, 39,200; in 1901, 45,500. Carlisle was a Roman station, under the name of Luguvallum. It was the seat of the ancient kings of Cumbria, and bore the British name of Caer Luel. It was frequently ravaged by the Picts and Scots, and about 875 it was destroyed by the Danes, after which it remained desolate for 200 years. Thence, to the union of England and Scotland, it was closely connected with the border wars, and underwent many sieges. During the Civil War it declared for King Charles, and suffered severely at the hands of the Parliamentarians. Carlisle, in 1745, surrendered to the Pretender. The Duke of Cumberland afterwards took the city, and punished the leaders with death. The Carlisle tables of mortality, based on the deaths which occurred in Carlisle, 1779-87, were drawn up by Dr. Heysham, and have been ever since much used as a basis for life-insurance policies.

Consult: Creighton, *Carlisle* (London, 1889); Freeman, "Carlisle in English History," in *Archæological Journal*, Vol. XXXIX. (London, 1882); Marks, "Public Works in Carlisle," in *The Surveyor*, Vol. XVII. (London, 1900).

CARLISLE. A borough and county-seat of Cumberland County, Pa., 18 miles west-southwest of Harrisburg, on the Cumberland Valley and the Philadelphia and Reading railroads (Map: Pennsylvania, D 3). It is in a highly productive agricultural region, is well built, with broad and handsome streets, and has several fine public buildings. It is the seat of Dickinson College (Methodist Episcopal) (q.v.), of the United States Indian Training and Industrial School, and of the Metzger Institute for Girls. The industries include machine-shops, chain and frog switch works, shoe-factories, flour-mills, paper-box factories, carpet-factories, etc. Mount Holly Springs, in the mountains, is a popular summer resort. The government, as authorized by a general borough law of 1851, revised the following year, is administered by a burgess, elected for three years, and a borough council. Carlisle was laid out and settled in 1751; in 1794, during the Whisky Rebellion, the Pennsylvania and New Jersey troops assembled here; and on July 1, 1863, the borough was shelled by the Confederates. Population, in 1890, 7620; in 1900, 9626.

Consult: Wing, *History of Cumberland County, Pa.* (Philadelphia, 1879); *History of Cumberland and Adams Counties, Pa.* (Chicago, 1886).

CARLISLE, George William Frederick Howard, seventh Earl of (1802-64). An English statesman and author. He was born in London, April 18, 1802. The eldest son of the sixth Earl, he bore the courtesy title of Lord Morpeth. He was educated at Eton and Christ Church, Oxford, where, in 1821, he won the Chancellor's and the Newdigate prizes with a Latin and an English poem. In 1823 he took a first class in classics and graduated B.A. In 1826 he was attaché to his uncle, the Duke of Devonshire, in Russia; while abroad he was elected to Parliament as a Whig, and on his return supported the repeal of the Jewish disabilities in his maiden speech on March 5, 1827. In 1830 he was elected representative for Yorkshire, and after the Reform Bill, for the West Riding. Under Lord Melbourne, he was Chief Secretary for Ireland (1835-41), and his impartial distribution of patronage made him popular in Dublin. Rejected in 1841 by the West Riding, he was reëlected in 1846, and remained one of its representatives until his father's death (1848) seated him in the House of Lords. Under Lord John Russell's Ministry (1846-52), he was chief commissioner of woods and forests, and afterwards Chancellor of the Duchy of Lancaster. When Lord Palmerston was made Prime Minister in 1855, Carlisle was appointed Lord Lieutenant of Ireland, a post which he held until the advent of the Earl of Derby's Government in 1858. He succeeded to the same office again when Lord Palmerston was reinstated in 1859. In 1841-42 he traveled in the United States and Canada, and on his return described his visit in a series of popular lectures. He obtained fame as a literary man by these lectures and by another, *The Life and Writings of Pope* (1851). He published a tragedy, *The Last of the Greeks* (1828); *A Diary in Turkish and Greek Waters* (1854); and a volume of *Poems* was issued after his death. He died at Castle Howard, December 5, 1864. His *Viceregal Speeches*, edited by J. Gaskin, appeared in 1866.

CARLISLE, John Griffin (1835—). An American lawyer and politician. He was born in Kentucky, received a common school education, taught school, was admitted to the bar in 1858, and achieved an almost immediate success as a lawyer. In State politics also he took a prominent part, serving as Democratic member of the Kentucky House of Representatives (1859-61), as State Senator (1866-71), and as Lieutenant-Governor (1871-75), and from 1876 to 1890 was a member of the National House of Representatives, being Speaker from 1883 to 1889. In 1890 he was elected United States Senator. In Congress he was a prominent advocate of revenue reform; and was regarded as one of the leading advocates of free trade, although he favored only an approximation to the free-trade standard. He was Secretary of the Treasury during President Cleveland's second administration (1893-97), and afterwards settled in New York to resume the practice of law.

CARL'ISTS. The supporters of Don Carlos and his descendants in their pretensions to the Spanish crown after the death of Ferdinand VII. Their opponents who supported the Queen Regent Christina (see Maria Christina) were sometimes known as Cristinos. See Carlos, Don.

CAR'LO KHAN, kän (It. *Carlo*, Charles + *Khan*, Fr. *khan*, Turk., Pers. *khān*, prince, of Tartar origin). A familiar appellation gained by Charles Fox through his introduction of the 'India Bill' in Parliament.

CAR'LOMAN, or Karlmann (751-71). A King of the Franks, younger brother of Charlemagne. He was anointed in 754 by Pope Stephen III., jointly with Charlemagne, and at the division of territory between himself and Charlemagne in 768 received Burgundy, Alsace, Provence, Alemannia, and southeastern Aquitaine. He was crowned in the same year at Soissons. See Charles the Great.

CAR'LOS (Sp., Charles). (1) Biron's treacherous brother in Southerne's *Isabella.* (2) An emasculated bookworm who becomes bright and vigorous by the influence of a genuine passion, in Cibber's *Love Makes a Man.*

CARLOS, Don. (1) The alias of Don Sanche, the heir to the throne, in Corneille's comedy, *Don Sanche d'Aragon.* (2) The dissolute husband of Victoria, whom she later reclaims, in Mrs. Cowley's comedy, *A Bold Stroke for a Husband.*

CARLOS, kär'lôs, Don (1545-68). The son of Philip II. and Infante of Spain, born July 8, 1545, at Valladolid. He was as weak of intellect as he was vicious and untrustworthy in temper. He was excluded from the succession and finally tried by the Inquisition on a charge of conspiracy against the King. No sentence of death was formally imposed, but Carlos was imprisoned and died on July 24, 1568. The universal dislike for Philip II. gave currency to stories of cruelty and foul play, but these are not fully established. Opinions as to the character of Don Carlos vary considerably, but recent historical research has attempted to prove that he was afflicted with hereditary insanity. The traditional romantic story is preserved in Schiller's tragedy, *Don Carlos.* The story was disproved by Llorente, the Spanish historian of the Inquisition. Consult: Ranke, in *Wiener Jahrbücher der Litteratur*, Vol. XLVI. (Vienna, 1829); Gachard, *Don Carlos et Philippe II.* (Paris, 1867); Maurenbrecher, *Don Carlos* (Berlin, 1876); Prescott, *Philip II.* (Boston, 1856).

CARLOS, Don. The name of several pretenders to the Spanish crown. Don Carlos María José Isidoro de Bourbon, Count of Molina (1788-1855), was the second son of Charles IV. of Spain, and was educated chiefly by priests. After the expulsion of the French from Spain, his brother, Ferdinand VII., reascended the throne (1814), but as Ferdinand had married thrice without issue, Don Carlos hoped to succeed his brother. An insurrection in his interest broke out in 1825 in Catalonia, but was put down. Don

Carlos himself not participating in it. Ferdinand, however, married for a fourth wife, Maria Christina of Naples, who bore him a daughter, the Infanta Maria Isabella, October 10, 1830. As the Salic law, excluding females from the succession to the throne, had been abrogated on March 29 of the same year, the hopes of the Carlists were destroyed. During the illness of the King, in September, 1832, the Carlists succeeded in obtaining from him the re-institution of the Salic law; but this he revoked as soon as he had partially recovered. As Don Carlos still continued his agitation, he was banished, in 1833, to Portugal, and soon afterwards was commanded to reside in the Papal States. But before Carlos had embarked for Italy, King Ferdinand VII. died, September 29, 1833. Don Carlos was now recognized by his party as heir to the throne of Spain, and the usurper Dom Miguel of Portugal supported his claim. In 1834 a quadruple treaty was concluded between England, France, Spain, and Portugal, directed against Dom Miguel and Don Carlos, which resulted in the dethronement of Dom Miguel. In June, 1834, Don Carlos embarked for England. In the following month he returned to the Continent, and passed in disguise through France into Spain, where he excited an insurrection in the northern provinces. The conflict raged till 1839, when the power of Don Carlos was broken by the surrender of General Maroto, and the pretender was compelled to escape into France. In 1836 his claims to the throne were unanimously rejected by the Cortes. In 1845 he abdicated in favor of his eldest son, and died at Triest, March 10, 1855. Don Carlos Luis Fernando de Bourbon, Count of Montemolin (1818-61), son of the preceding, succeeded to his claims, and was recognized by the Carlists as Charles VI. In 1860 a Carlist insurrection was once more attempted, in which he was made a prisoner, and released only after signing a renunciation of his claims to the Spanish throne.—Don María de los Dolores Juan Isidoro Josef Francesco Quirino Antonio Miguel Gabriel Rafael Carlos, Duke of Madrid, was born March 30, 1848. He is the nephew of the preceding, and the present Carlist claimant of the throne of Spain. As Charles VI. died without issue, his rights devolved upon his brother Don Juan, who had married the Archduchess Maria Beatrix of Austria, Princess of Modena. Their son, Carlos María de los Dolores Juan Isidoro José Francesco, was educated principally in Austria, and married Margaret de Bourbon, Princess of Parma, and sister of the Comte de Chambord. In October, 1868, Don Juan abdicated in favor of his son, whose standard was raised by some of his partisans in the north of Spain in April, 1872. On the 16th of July following, Don Carlos published a proclamation calling upon the people of Catalonia, Aragon, and Valencia to take up arms in his cause, promising to restore their ancient liberties, and in December his brother, Don Alfonso, assumed command of the Carlist forces in Catalonia. Don Carlos himself entered Spain, July 15, 1873, announcing that he came for the purpose of saving the country. Thenceforward there was incessant war in the northern part of the country, but for the most part the struggle was unfavorable to the Carlists, and in February, 1876, when their last stronghold, Estella, had fallen, Don Carlos fled into France. He went to Paris, where, March 3, 1876, he issued a proclamation giving up the struggle but refusing to relinquish his claims. He was expelled from France, in 1881, for ostentatiously supporting the claim of the Comte de Chambord to the French throne. Don Carlos has five children, four daughters and a son.

CARLOTA, kär-lō'tȧ, La. A town of Negros, Philippines, in the Province of Western Negros, situated 29 miles from Bacolod. Population, in 1898, 12,384.

CARLOT'TA (Sp., Charlotte) (1840—). The name generally applied to the ex-Empress of Mexico, Marie Charlotte Amélie, the daughter of Leopold I., King of the Belgians. She was born June 7, 1840, and was married at the age of seventeen to Archduke Maximilian, of Austria, afterwards Emperor of Mexico. She accompanied him to Mexico in 1864, whither, at the suggestion of Napoleon III., he had been invited by the Assembly of Notables. The Empress remained with him until he found it imperative to send her to France (1866) to seek aid from Napoleon III. Her mission was fruitless. She then applied to the Pope, who had blessed Maximilian previous to his departure for his new empire in the Western Hemisphere, but she was again doomed to disappointment. Her failure and the disastrous consequences attending the closing days of the Mexican Empire shattered her reason. She was taken to the château of Laeken, and later to the Château de Bouchoute, not far from Brussels.

CARLOVIN'GIAN CY'CLE, The. A series of poems centred about Charlemagne and his knights, composed chiefly during the Tenth and Eleventh centuries.

CARLOVINGIANS. See Carolingians.

CARLOW, kär'lō (Celtic). A small inland county of Ireland, in Leinster Province, with an area of about 349 square miles, of which six-sevenths are arable (Map: Ireland, E 4). The chief towns are Carlow, Tullow, and Bagenalstown. Population, in 1841, 86,400; in 1851, 68,200; in 1891, 41,934; in 1901; 37,700. Consult Ryan, *History and Antiquities of the County of Carlow* (Dublin, 1833).

CARLOW. The capital town of Carlow County, Ireland, at the confluence of the Burren and the Barrow, 56 miles southwest of Dublin by rail (Map: Ireland, E 4). It is a well-built town, and, with its extensive flour-mills, serves as the emporium for the agricultural produce of the district. Population, 6600. There are remains of a castle, picturesquely situated on an eminence on the Barrow, founded in 1180 by Sir Hugh de Lacy. The town grew up around the castle, which was several times besieged by, and alternately in the possession of, the English and Irish. In the Irish insurrection of 1798, the insurgents attacked the town, but were repulsed with a loss of 600 men. Consult Ryan, *History and Antiquities of Carlow* (Dublin, 1833).

CARLSBAD, kärls'bät. See Karlsbad.

CARLSBAD DECREES. The resolutions adopted by a conference of delegates of the principal German States at Karlsbad in 1819, and promptly ratified by the Federal Assembly. They were aimed at the liberal agitation then rampant and were a part of the reactionary policy of Prince Metternich. The press was put under a strict censorship and the universities under police supervision. The *Burschenschaft* was to be suppressed, and a federal committee of seven was appointed to inquire into "the origin and ramifications of revolutionary conspiracies and demagogic associations." At the Conference of Vienna in the following year constitutions were declared incompatible with the rights of the sovereigns. See BURSCHENSCHAFT, and METTERNICH.

CARLSBURG, kärls'bo͞ork. See KARLSBURG.

CARLSCRONA, kärls'krō-nȧ. See KARLSKRONA.

CARL'SEN, EMIL (1848—). A Danish-American artist. He came to this country in 1872 and settled first in Boston and then in New York (1887). His pictures are shown frequently in American exhibitions and he is considered an excellent painter of still life.

CARLSHAMN, kärls'häm. See KARLSHAMN.

CARLSON, kärl'sôn, FREDERIK FERDINAND (1811-87). A distinguished Swedish statesman and historian. He was born June 13, 1811, at Kungshamn, in Upland, and was educated at the University of Upsala. After traveling extensively in Europe he became an instructor at Upsala, but in 1837 was appointed tutor to the royal princes at Stockholm, a post he held until 1846. In 1849 Carlson succeeded Geijer as professor of history in the University of Upsala, and in 1860 he was chosen rector. From 1850 to 1865 Carlson sat in the national Diet as the representative first of his university and later of the Swedish Academy of Sciences, to which he had been chosen in 1858, and from 1873 on he had a seat in the first Chamber as the representative of Gefleborg. From 1863 to 1870, and from 1875 to 1880, he was head of the Department of Public Worship. He always lent his aid to the cause of progress in education and religion. As an historian Carlson made a name for himself by continuing Geijer's seven-volume history of Sweden, *Sveriges Historia under konungarne af Pfalziska huset* (Stockholm, 1855-85). The work has also been published in German, in the Heeren, Ukert, and Giesebrecht series, *Geschichte der europäischen Staaten*, and ranks among the best works in that standard collection. He also produced a number of monographs, several of them in Latin, on special periods of history. He died March 18, 1887.

CARLSRUHE, kärls'ro͞o-*e*. See KARLSRUHE.

CARLSTAD, kärl'städ. See KARLSTAD.

CARLSTADT, kärl'stät. See KARLSTADT.

CARLSTADT, KARLSTADT, or **KAROLSTADT** (c.1480-1541). A German reformer whose real name was Andreas Rudolf Bodenstein, and who was at first a friend, but later an opponent, of Luther. He was born at Karlstadt, Franconia; studied at the universities of Erfurt (1500-03), Cologne (1503), and Wittenberg (1504), and in the last became a professor, first in philosophy and then in theology. In 1510 he was made D.D. and Archdeacon of All Saints Church in Wittenberg. It was then that he became a personal friend of Luther. In 1515 Carlstadt went to Rome to study canon law and took the degree of LL.D. Returning to Wittenberg in 1516, he openly broke with scholasticism and defended Reuchlin, against whom a violent persecution was raging. When Luther, on October 31, 1517, nailed his theses to the door of the town church of Wittenberg, Carlstadt supported him. In 1518 he published arguments asserting the supreme authority of the Scriptures, and declaring that in the silence of the Scripture appeals from the fathers of the Church must be made to reason. He participated in the Leipzig Disputation of 1519 on the side of Luther, and in the bull against Luther (1520) Carlstadt was condemned. He was the first to appeal from the Pope to a general council. In 1521, by invitation of the King, he went to Denmark to teach the doctrines of the Reformation; but he returned after a few weeks. On December 26, 1521, he married Anna von Mochau. About this time differences sprang up between Carlstadt and Luther, owing to the former's desire to break at once and entirely with the Old Church, whereas Luther would go more slowly. While Luther was at the Wartburg (1521), Carlstadt took the lead, and, supported by the city government, and perhaps the majority of the citizens, restored the cup to the laity, abolished the fasting regulations, the elevation of the host, and auricular confession. These changes were very distasteful to the Elector, and so Luther left the Wartburg and opposed them in Wittenberg and restored the old order. Finding his position uncomfortable, Carlstadt became pastor at Orlamünde, in Thuringia (1523), where his radical Church reforms, joined to his well-known independence of Luther, created a suspicion that he was associated with the Anabaptists, and that he might be implicated in the schemes of the peasant revolt. The Elector sent Luther to find out the true state of affairs; and when Luther preached against Carlstadt at Jena, the two reformers held a discussion upon the Real Presence, which Carlstadt was the first to deny; and an open quarrel broke out between them. Carlstadt was ordered out of Saxony (1524), and wandered from place to place, preaching Protestantism, but his radicalism may have at times prompted the people lawlessly to destroy pictures and images in the churches, so that he was accused of lawless action himself. He was at Rothenburg when the Peasant War broke out (1525), and he acted as mediator with the peasants, but in vain. Again suspected of provoking insurrection, he was pursued and exposed to hardships and even danger to his life. In this extremity he appealed to Luther, who, on condition that he would not advocate his sacramental views, used his influence so successfully that he was permitted to return to Saxony (1525), where for some years he led a quiet life. But this quiet and, especially, lack of soul liberty were unendurable to his restless spirit, and he once more attacked Luther. The controversy upon the Lord's Supper, in which Zwingli agreed with Carlstadt, grew fiercer than ever, and Carlstadt, who was no longer permitted to dwell in Saxony, fled to Friesland (1530), and thence to Bern, and then to Zurich, where Zwingli kindly received him, secured employment for him as proof-reader in the Froschauer printing house, and later placed him as *diaconus* in the Spital. In 1534 he settled as professor of theology in Basel, remaining there until his death of the plague, December 24, 1541. His character was very differently judged in his own times and since, according to whether the sympathies of the person speaking were with Luther or Zwingli. Thus the Lutherans condemn him as a radical and tactless zealot, and immediately after his death accepted the tale that the devil had carried him off, while the Swiss German and South German theologians ever speak very kindly of him. For his life, consult: J. C. Jäger (Stuttgart, 1856) and Hermann Barge (announced); for list of his works, H. W. Rotermund, *Erneuertes Andenken der Männer die für und gegen die Reformation Lutheri gearbeitet haben*, Vol. I (Bremen, 1814). Many of his letters are in J. G. Olearius, *Scrinium Antiquarium* (Halle, 1671, 2d ed., 1698).

CARL′TON. A town in Nottinghamshire, England, 2½ miles northeast of Nottingham, noted for its manufactures of hosiery (Map: England, E 4). Population, in 1891, 6600; in 1901, 10,000.

CARLTON, THE. The leading Conservative political club in London. It was founded in 1832 by the Duke of Wellington, and it now numbers about 2000 members. Its headquarters are at No. 94 Pall Mall, the building being remarkable for its polished granite pillars, which are in imitation of Sansovino's Library of Saint Mark at Venice.

CARLTON HOUSE. A house erected for Lord Carlton in the present Carlton House Terrace, London, in 1709, and demolished in 1827. It was made famous by being occupied by the Prince of Wales in 1732, and later by George IV., when he was Prince Regent. The intimates of the Prince of Wales were known as 'The Carlton House Set.'

CARLU′DOVI′CA PALMA′TA (Neo-Lat. in honor of Charles IV. of Spain, Lat. *Carolus Ludovicus*, and Neo-Lat. fem. sing. of Lat. *palmatus*, marked like the palm of the hand, from *palma*, palm of the hand). A South American palm-like plant of the order Cyclanthaceæ. It bears leaves four feet in diameter from which Panama hats are woven, the best of which are plaited from a single leaf stripped in such a manner as to require no joining. In addition to *Carludovica palmata* there are about forty species, all of them natives of America. They have leaves resembling the fan-palms, are very ornamental, and are usually considered by growers as palms, and are treated similarly. See PANAMA HATS.

CARLYLE, kär-līl′. A city and county-seat of Clinton County, Ill., 48 miles east of Saint Louis, on the Kaskaskia River, and on the Baltimore and Ohio Southwestern Railroad (Map: Illinois, C 5). It has manufactures of bricks, flour, spokes, paper, rock-crushers, etc., and a trade in grain and flour. Population, in 1890, 1784; in 1900, 1874.

CARLYLE, JANE WELSH (1801-66). The wife of Thomas Carlyle. She was descended through her father from John Knox, and on her mother's side claimed relationship with William Wallace. When Edward Irving was a teacher at Haddington, she was his private pupil, and the friendship thus begun would have culminated in their marriage had it not been for Irving's previous engagement to Miss Martin. When only fourteen she had written a tragedy, and for many years continued to write poetry. In 1821 Irving introduced Carlyle (who was ignorant of his friend's attachment) to Miss Welsh. They began a correspondence on literary matters and soon became intimate, although she refused to consider him otherwise than as a friend. In 1822 Irving wrote to her his final letters of farewell, and three years later she and Carlyle were engaged. They were married October 17, 1826. Though there is no doubt that Carlyle sincerely loved his wife or that she reciprocated the feeling, their married life was marred by his uncertain temper, the interference of his family, and her own critical disposition.

CARLYLE, JOHN AITKEN (1801-79). An English physician, brother of Thomas Carlyle. He studied medicine at Edinburgh University; was traveling physician to the Countess of Clare, and afterwards to the Duke of Buccleuch. After abandoning his practice (1848) he lived for a time at Chelsea near his brother. He made an excellent prose translation of Dante's *Inferno* (1849; rev. 1867).

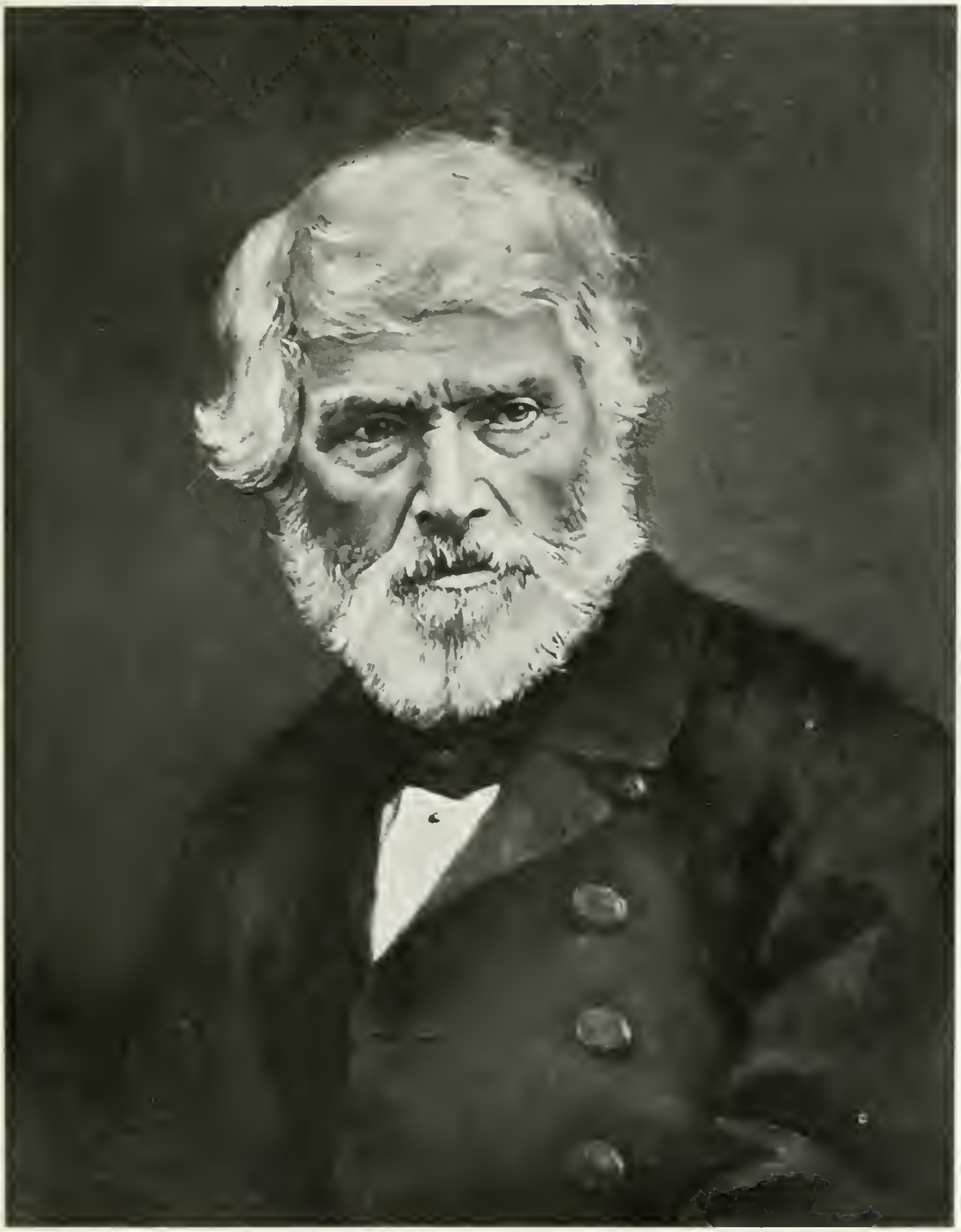
CARLYLE, JOSEPH DACRE (1759-1804). An English Orientalist. He was born at Carlisle, graduated at Cambridge, and in 1793 succeeded Dr. Paley as chancellor of Carlisle. In 1795 he was appointed professor of Arabic at Cambridge. He had already published a translation of an Arabic history of Egypt, and in 1796 he issued a volume of *Specimens of Arabic Poetry*. Lord Elgin procured Carlyle's appointment in the Turkish embassy, which gave him an opportunity to travel in the East, where he collected Greek and Syriac manuscripts for a contemplated revision of the New Testament, but he did not live to do the work. His Arabic Bible, edited by H. Ford, professor of Arabic at Oxford, was published in 1811.

CARLYLE, THOMAS (1795-1881). A Scottish man of letters. He was born at Ecclefechan, Dumfriesshire, Scotland, December 4, 1795. Educated first at the village school, and afterwards at Annan, he passed, in 1809, to Edinburgh University, with a view to entering the Scottish Church. Here he studied irregularly, but with amazing avidity. The stories which are related of his immense reading are almost fabulous. About the middle of his theological curriculum, Carlyle felt wholly disinclined to become a clergyman, and, after a short period spent in teaching at Annan, and later at Kirkcaldy, where he formed a lifelong friendship with Edward Irving, he went to Edinburgh and embraced literature as a profession. His first efforts were contributions to Brewster's *Encyclopædia*. In 1824 he published a translation of Legendre's *Geometry*, to which he prefixed an essay on proportion, mathematics having, during his college years, been a favorite study with him. In 1823-24 appeared in the *London Magazine* his *Life of Schiller;* and in 1824 his translation of Goethe's *Wilhelm Meister*. In 1825 the *Life of Schiller* was recast, and published in a separate form. It was very highly praised; indeed, one can discern in the criticisms of the book a dawning recognition of the genius of Carlyle. The translation of *Wilhelm Meister* met with a somewhat different fate. De Quincey, in one of his acrid and capricious moods, attacked both Goethe and his translator; while Jeffrey, in the *Edinburgh Review*, admitting Carlyle to be "a person of talents," slashed in cavalier fashion at the book. It is one of the most excellent translations of a foreign work in the English language. In 1826 Carlyle married Jane Baillie Welsh, a lineal descendant of John Knox, and during the same year appeared his *Specimens of German Ro-*

mance. From 1828 to 1834 he resided at Craigenputtoch, a small estate in Dumfriesshire, belonging to his wife—the "loneliest nook in Britain," as he says himself in a letter to Goethe. Here Carlyle revolved in his mind the great questions in philosophy, literature, social life, and politics, to the elucidation of which—after his own singular fashion—he earnestly dedicated his whole life. Here also he continued to write, for various magazines, the splendid series of critical and biographical essays which he had begun two years before. For this work he was admirably equipped. Besides possessing an exact knowledge of the German language, he was also inspired by the conviction that the literature of Germany, in depth, truthfulness, sincerity, and earnestness of purpose, was greatly superior to what was admired and relished at home. He had, moreover, a genius for writing literary portraits. Through him England discovered Germany. One of his most beautiful, eloquent, and solid essays, written at Craigenputtoch, was that on Burns (*Edinburgh Review*, 1828). It has given the tone to all subsequent criticism of the Scottish poet. But his *chef-d'œuvre*, written on the moorland farm, was *Sartor Resartus* ("The Tailor Done Over," the title of an old Scottish song). This work, which first appeared in *Fraser's Magazine* (1833-34), is, like most of Carlyle's later productions, an indescribable mixture of the sublime and the grotesque. It professes to be a history or biography of a certain Herr Teufelsdröckh ("Devil's Dirt"), professor in the University of Weissnichtwo ("Kennaquhair"), and contains the manifold opinions, speculations, inward agonies, and trials of that strange personage—or rather of Carlyle himself. The whole book quivers with tragic pathos, solemn aspiration, or riotous humor. In 1834 Carlyle removed to London, taking a house in Cheyne Row, Chelsea. In 1837 appeared *The French Revolution.* Nothing can be more gorgeous than the style of this 'prose epic.' A fiery enthusiasm pervades it, now softened with tenderness, and again darkened with grim mockery, making it throughout the most wonderful image of that wild epoch. Carlyle looks on the explosion of national wrath as a work of the divine Nemesis, who "in the fullness of times" destroys, with sacred fury, the accumulated falsehoods of centuries. To him, therefore, the Revolution is a "truth clad in hell-fire." During the same year he delivered in London a series of lectures on German literature: in 1838 another series on *The History of Literature, or the Successive Periods of European Culture;* in 1839, another on *The Revolutions of Modern Europe;* and a fourth in 1840, on *Heroes, Hero-Worship, and the Heroic in History;* of these Carlyle prepared only the last for publication (1841). In the meantime he had published *Chartism* (1839). In 1843 followed *Past and Present,* which, like its predecessor, showed the deep, anxious, sorrowful interest Carlyle was taking in the actual condition of his countrymen. In 1845 he published what is considered by many his masterpiece, *Oliver Cromwell's Letters and Speeches, With Elucidations and a Connecting Narrative.* The research displayed in this book is something marvelous, but the author was nobly rewarded for his toil by the abundant admiration given to his work. In 1850 appeared the Latter-Day Pamphlets, the fiercest, most sardonic, most furious of all his writings. These vehement papers were followed the next year by the *Life of Sterling,* calm and tender in tone. For many years Carlyle had been at work on the *History of Frederick the Great.* The vast undertaking, resulting in six volumes, was at length carried through (1858-65). In 1865 Carlyle was elected Lord Rector of Edinburgh University.

The sudden death of Mrs. Carlyle, in 1866, overwhelmed her husband with grief. Henceforth his life became more and more secluded. His work was now done. In 1867 Carlyle visited Mentone, where he composed part of his personal *Reminiscences;* then returning to London, contributed to *Macmillan's Magazine* an article entitled "Shooting Niagara," in which he gave his views of democracy. In 1875 appeared the *Early Kings of Norway.* In 1874 he received the Prussian royal Order *Pour le Mérite* in recognition of his having written the life of Frederick the Great; and in the same year he was offered by Disraeli the Grand Cross of the Bath and a liberal pension, but he declined them both. On February 4, 1881, he died at his house in Chelsea, and was buried among his kindred at Ecclefechan. His wife rests beside her father at Haddington. Carlyle appointed James Anthony Froude his literary executor, who, in conforming with the terms of the trust, published *Carlyle's Reminiscences* (1881); *Thomas Carlyle: The First Forty Years of His Life* (1882); *Letters of Jane Welsh Carlyle,* exhibiting her as an accomplished woman and brilliant letter-writer (1883); and *Thomas Carlyle: Life in London* (1884). A revulsion of feeling regarding Carlyle's character followed, the literary world being shocked by the bitterness and spite abounding in these records, and Froude was attacked with great violence for his indiscretion. But time has revived the former admiration for Carlyle's genius. In 1882 a statue was erected to his memory on the Chelsea embankment, and in 1895 his house in Cheyne Row was purchased and opened to the public. A centenary edition of his *Works,* 30 vols., was published (London and New York, 1896-99). Consult: *The Correspondence of Thomas Carlyle with Ralph Waldo Emerson* (Boston, 1883); *Early Letters of Thomas Carlyle* (New York, 1886; second series, 1888); *Correspondence Between Goethe and Carlyle* (New York, 1887)—all edited by Prof. C. E. Norton; also, Copeland, *Carlyle's Letters to His Youngest Sister* (London, 1889). For his life and works, consult: Shepherd and Williamson, *Memoirs of the Life and Writings of Thomas Carlyle* (London, 1881); Wylie, *Thomas Carlyle, the Man and His Books* (London, 1881); Masson, *Carlyle Personally and in His Writings* (London, 1885); Larkin, *Carlyle and the Open Secret of His Life* (London, 1886); Garnett, *Life* (London, 1887); Nichol, *Life* (New York, 1894); Wilson, *Froude and Carlyle* (New York, 1898); Mrs. Ireland, *Life of Jane Welsh Carlyle* (London, 1891); and Shepherd, *The Bibliography of Thomas Carlyle* (London, 1882).

CARMAGNOLA, kär'mȧ-nyō'lȧ (from the Italian town *Carmagnola*) (c.1390-1432). An Italian condottiere, whose real name was Francesco Bussone. For many years he was the most important commander under Filippo Maria Visconti, Duke of Milan, for whom he subdued Bergamo, Brescia, Parma, Genoa, and other cities. Having been brought by his enemies into



THOMAS CARLYLE
FROM THE PAINTING BY P. KRÄMER

ill favor with the Duke, he offered his services to Venice, and led a most successful campaign against Milan. After the defeats of a second campaign, the Republic, suspecting treason, caused him to be beheaded. His fate has been celebrated in Manzoni's tragedy, *Il conte di Carmagnola* (1820).

CARMAGNOLE, kär′mȧ′nyôl′ (Fr., perhaps from the Italian town *Carmagnola*). The name of a popular song and dance during the French Revolution, rivaling in popularity among patriots and soldiers the "Marseillaise" and the famous "Ça Ira" (q.v.). It first became well known after the storming of the Tuileries, August 10, 1792. The song began with:

"Madame Véto avait promis,"

and every verse ended with the refrain:

"Dansons la Carmagnole, vive le son, vive le son,
Dansons la Carmagnole, vive le son du canon!"

The words, however, did not always remain the same; couplets were added from time to time descriptive of the famous incidents of the Revolution, so that the Carmagnole became a typical song of the streets. Fashion soon adopted the word, which was next applied to a sort of jacket, worn as a symbol of patriotism. Afterwards it was applied to the bombastic and fanatical reports of the successes and glory of the French arms. With the passing of the Reign of Terror the song practically disappeared.

CAR′MAN, William Bliss (1861—). A Canadian journalist and poet. He was born at Fredericton, New Brunswick, April 15, 1861. He was graduated at the University of New Brunswick (1881), studied at the University of Edinburgh (1881-83), at Harvard (1886-88), practiced engineering, taught, and became literary editor of the New York *Independent* (1890-92). His first volume of verse, *Low Tide on Grand Pré* (1893), commanded general and favorable attention. It was followed by *Songs from Vagabondia* (1894); *Behind the Arras* (1895); *A Sea-Mark* (1895); *Ballads of Lost Haven* (1897); *By the Aurelian Wall* (1898); *More Songs from Vagabondia* (1896); and *Last Songs from Vagabondia* (1900). The volumes of *Vagabondia* were issued jointly with Richard Hovey. Much of his work is still uncollected or privately printed. See Canadian Literature.

CARMARTHEN, or **CAERMARTHEN**, kär-mär′THen (Welsh, *Caer Fyrddyn*, the *Maridunum* of Ptolemy). A seaport town, capital of Carmarthenshire, South Wales, on the right bank of the Towy, 25 miles north-northwest of Swansea (Map: Wales, B 5). It lies in a picturesque situation, but the streets are irregular, steep, and often narrow. The Towy is navigable for vessels of 200 tons up to the town. There are tin and iron works in the neighborhood, and the town carries on a considerable export trade in tin plates, cast iron, timber, marble, slates, lead ore, grain, butter, and eggs. Population, in 1901, 9900. Near Carmarthen are the remains of two Roman camps. The neighborhood along the banks of the river was, according to tradition, one of the favorite haunts of Merlin the Enchanter. It was long the residence of the native princes of South Wales.

CARMARTHENSHIRE, or **CAERMARTHENSHIRE**. A maritime county in South Wales, on the Bristol Channel. It is bounded north by Cardigan, from which it is separated by the Teifi; east by Brecknock; south by Glamorgan and Carmarthen Bay; and west by Pembroke (Map: Wales, B 5). It is the largest of the Welsh counties; area, 918 square miles, nearly a third of which is waste. Iron, coal, copper, and lead mining, stone-quarrying, cattle-raising, grain-culture, hide-curing, and woolen manufactures are the chief industries. The chief towns are Carmarthen (the county town), Llanelly, Llandeilo-vawr, Llandovery, Newcastle-in-Emlyn, and Kidwelly. Population, in 1891, 130,566; in 1901, 135,251.

CAR′MEL (garden or choice plantation). A mountain range rising abruptly from the plain of Dothan, near Jenin, and extending in a northwest direction for about 26 miles (Map: Palestine, B 2). The northwest end is almost at the Mediterranean and terminates as abruptly as the eastern. The highest point of the range is at Esfiyeh, where 1810 feet above sea-level is reached. On the eastern side of the range is the Plain of Esdraelon, watered by the brook Kishon, and on the western side the Plain of Sharon. Carmel, though forming a natural barrier which affected the course taken by invaders of the country, did not play any part in the military history of the Jews, but it is important in the religious history. It was in the Carmel district, forming part of Ahab's dominions, somewhere between Samaria and Ekron, that Elijah had the priests of Baal slaughtered (I. Kings xviii. 17-39). Elisha also visited it (II. Kings ii. 25; iv. 25). Carmel was always productive, so that with the prophets it is the type of a land blessed by God (Isa. xxxv. 2; Jer. i. 19; Micah vii. 14), and the devastation of this district was threatened with severe punishment. The mountain was regarded as sacred and had the name 'Mount of God' in very early times. Anchorites established themselves there in the early days of Christianity, and many monasteries were built along the range in the course of time. One of these Napoleon used in 1799 as a hospital for the sick and wounded of his army. A German colony now cultivates a portion of the range, and has built a sanatorium upon the highest part. Consult George Adam Smith, *Historical Geography of the Holy Land*, pp. 337-340.

CAR′MEL. A town and county-seat of Putnam County, N. Y., 50 miles north by east of New York City; on Lake Gleneida and on the New York Central and Hudson River Railroad (Map: New York, G 4). It is the seat of Drew Seminary for Young Women, and has a Literary Union Library. Within the limits of the town is the celebrated summer resort, Lake Mahopac. Carmel was the birthplace of Daniel Drew (q.v.), and here Enoch Crosby, the 'spy' of Cooper's celebrated novel, is buried. Population, in 1890, 2912; in 1900, 2598.

CARMEL, Knights of the Order of Our Lady of Mount. An order instituted by Henry IV. of France to take the place of the Knights of Saint Lazarus of Jerusalem, suppressed by him. It consisted of 100 gentlemen, all French, who were required to follow in general the Carmelite rule, as far as their life in the world would allow. The order was confirmed by bull by Pope Paul V., in 1608. The first grand master was Philibert de Nerestang, who had held the same position in the Order of Saint Lazarus. Louis XIV. restored the earlier name, and combined it with the later. In his time the order numbered 145 commanderies, but the French Revolution put an end to it.

CARMELITES, or ORDER OF OUR LADY OF MOUNT CARMEL. A monastic order about whose origin there has been no little controversy. At one time it was piously believed to have been founded by the prophet Elijah; but this belief was dissipated by the learned editors of the *Acta Sanctorum,* who were able to demonstrate that it owed its origin to the crusader Bertrand, Count of Limoges. He had become a monk in Calabria in fulfillment of a vow made on the eve of a battle in which he was victorious. In 1156, with ten companions, he took up his abode on Mount Carmel; their first definite rule was given them in 1208 by Albert, patriarch of Jerusalem. In 1240 the pressure of Mohammedan domination induced them to abandon their settlement. Offshoots had already (1238) been founded in Cyprus and Messina: and now some went to Provence and some to England. Innocent IV., in 1245, sanctioned the change from a hermit to a community life, and ranked them with the mendicant orders. At a general chapter held at Aylesford, in Kent, the same year, an Englishman, Saint Simon Stock, was elected the first general. Under his leadership the order, with some modifications adapting it to climatic and other differences, spread throughout central and western Europe. It is to him that the Virgin Mary is said to have revealed in a vision the scapular which became a distinctive mark of the order and those who were affiliated to it. From the white cloak which they wore, they received the popular name of White Friars. The rigidity of their rule was somewhat relaxed by Eugenius IV. in 1431; but some communities, objecting to this change, adhered to the stricter rule, and were known as Observantines, while the more lax were called Conventuals. The most thorough-going reform was that instituted by Saint Theresa (q.v.), who became a Carmelite novice in 1531, and labored unceasingly for a stricter discipline among the nuns. With the aid of Saint John of the Cross, she thus affected the male members of the order also. At her death, in 1582, there were seventeen houses of women and fifteen of men who followed the stricter rule, and were known as Discalced or Barefooted Carmelites. The order had fifty-two houses in England at the time of the dissolution of the monasteries. In 1901 there were fifty-one Carmelite fathers in the United States and Canada.

CAR'MEN. A novel by Prosper Mérimée (1847). It was afterwards adapted for the operatic stage by Meilhac and Halévy, the score being furnished by Bizet and presented in 1875 at the Opéra Comique, Paris. Its plot deals with the career of a Spanish girl, who begins life in a cigarette factory, and ends with the tragedy which results from her capricious loves. The scene is laid partly in Seville. Consult Filon, *Prosper Mérimée* (Paris, 1894).

CARMEN SAECULARE, sĕk'ū-lā'rē. An ode by Horace, composed for the celebration of the Secular Games in B.C. 17. It contains 761 lines in 19 stanzas designed to be sung by a chorus of boys and one of girls. It was written at the request of Augustus and is not of a high order of poetic merit.

CARMEN SYLVA, sĭl'vȧ. See ELIZABETH, QUEEN OF RUMANIA.

CARMEN'TAL GATE. A gate of ancient Rome named after the Italian goddess Carmenta. Through it the Fabii passed on their fatal expedition against Veii. The gate in consequence was afterwards called Scelerata, the accursed.

CARMI, kär'mī. A city and county-seat of White County, Ill., 38 miles west by north of Evansville, Ind., on the Little Wabash River, and on the Cleveland, Cincinnati, Chicago and Saint Louis and the Louisville and Nashville railroads (Map: Illinois, D 5). It is the centre of an agricultural region and exports fruit, grain, flour, tile, and lumber; and has flouring and saw mills, brick and tile works, machine-shops, stave and heading factory, etc. Population, in 1890, 2785; in 1900, 2939.

CAR'MINA BURA'NA. A collection of German and Latin poems written by the Goliards, or wandering scholars, mostly declared churchmen of the Twelfth and Thirteenth centuries. The name is derived from the Abbey of Benediktbeuern in Bavaria, where the manuscript, now in Munich, was once kept. The songs in form resemble hymns, and generally are rhymed. In matter they vary greatly, ranging from lofty sentiment to very worldly drinking songs. Some of the compositions severely satirize the prevalent vices of the various professions, particularly of the clergy.

CARMIN'ATIVES (Fr. *carminatif,* Neo-Lat. *carminativus,* from Lat. *carminare,* to card wool, from *carmen,* card, for wool, from *carere,* to card wool; hardly from Lat. *carmen,* song, incantation). The medicines which relieve flatulence and pain in the bowels, such as cardamoms, peppermint, ginger, and other stimulating aromatics.

CARMINE (Fr., Med. Lat. *carmesinus,* Pers. *qirmizī,* crimson, from Skt. *krmijā,* produced by a worm, from *krmi,* worm + *janati, jāyatē,* to be born). A beautiful red pigment obtained from cochineal and employed in the manufacture of the finer red inks, in the dyeing of silk, in coloring artificial flowers, and in miniature and water-color painting. It was first prepared by a Franciscan monk at Pisa, who discovered it accidentally while compounding some medicine containing cochineal, and in 1656 it began to be manufactured. One process for its preparation is as follows: Digest 1 pound of cochineal in 3 gallons of water for 15 minutes, add 1 ounce of cream of tartar, heat gently for 10 minutes, add half an ounce of alum, boil for 2 or 3 minutes, and after allowing any impurities to settle, place the clear liquid in clean glass pans, in which the carmine will be slowly deposited; after a time drain off the liquid, and let the carmine dry in the shade. In the preparation of carmine, much depends on a clear atmosphere and a bright, sunny day, as the pretty color of the carmine is never nearly so good when it has been prepared in dull weather; and this accounts, in great part, for the superiority of French carmine over that prepared elsewhere. An excellent quality of carmine may also be obtained by pulverizing cochineal, treating it with a solution of sodium carbonate, adding albumin to the solution, and then precipitating with dilute acid. The coloring principle of cochineal is carminic acid, $C_{17}H_{18}O_{10}$, an amorphous red substance soluble in water and in alcohol; carmine is a compound of this acid with chalk and alumina. With zinc oxide and alumina carminic acid forms the valuable coloring substance known as carmine lake, which is made from the residues of cochineal obtained in the manufacture of carmine. Carmine lake is largely used in painting and in printing.

CARMO, kär'mō. See KARMÖ.

CARMO'NA (Sp., of Celtiberian origin). A city of Spain, in the Province of Seville, 20 miles northeast of Seville (Map: Spain, C 4). It is situated on an elevated ridge, overlooking a fertile plain, and with its Moorish walls and castle has a very picturesque appearance. It contains the fine Gothic Church of Santa María; the Church of San Pedro, with a tower similar to the Giralda of Seville; a ruined Alcazar; and the interesting gates leading to Córdoba and Seville. A short distance from the city to the west is a Roman necropolis of great archæological value. The city has flour and oil mills, manufactures of woolen cloth, hats, leather, etc., and an important annual fair. Population, in 1900, 16,338. Carmona (known as *Carmo*) was of considerable importance under the Romans, a prominence which it retained in the Middle Ages. It fell into the power of the Moors, from whom Saint Ferdinand of Castile took it in 1247.

CARMONTELLE, kär'mōN'tĕl', LOUIS CARROGIS (1717-1806). A French dramatist. He was born in Paris, and for several years was reader to the Duke of Orleans, grandson of the regent. His literary reputation rests chiefly on his *Proverbes dramatiques* (10 vols., Paris, 1768-81; new ed., 4 vols., Paris, 1822), a series of short comedies adapted for private theatricals. In addition to this work, which has been freely borrowed from by later comic writers, his *Théâtre de campagne*, a collection of more than twenty-five comedies (4 vols., 1775), should be mentioned. He also had considerable artistic talent, and painted portraits of some of the most eminent persons of the Eighteenth Century. *Proverbes et comédies posthumes de Carmontelle* were published by Mme. de Genlis (3 vols., Paris, 1825).

CARNAC, kär'năk' (Celtic). A Breton parish and village in the Department of Morbihan, France, 17 miles southeast of Lorient (Map: France, C 4). The village, situated on a gentle slope overlooking the Bay of Quiberon, has an interesting archæological museum and a church built in 1639. The latter contains some fine marble altar-pieces of the Renaissance period. The inhabitants are engaged in agricultural and fishing pursuits, and coasting trade. Population of village, 1901, 646; of commune, 3125. The parish has world-wide fame in connection with some of the most remarkable megalithic monuments extant, and with the remains of a Gallo-Roman town. The chief megalithic relics are situated about half a mile to the north of the village, near the road leading to Auray, on a spacious desolate plain bordering the seashore. They consist of long lines of roughly hewn granitic menhirs or standing stones, varying from 3 to 18 feet in height, which, weather-beaten and covered with minute white lichens, present a succession of weird avenues.

There are three groups, containing 1991 menhirs; in the Sixteenth Century they numbered more than 15,000. Their exploitation for building purposes and to make room for agricultural improvements during the succeeding three centuries has been arrested by their becoming national property and being authoritatively classed among historical monuments. A fine view of the lines is obtained from the summit of Mont Saint-Michel, a grass-grown 'galgal' or tumulus, 65 feet high and 260 feet in diameter, consisting of blocks of stone piled over a dolmen and crowned with a chapel dedicated to the Archangel Michael.

The origin and object of these ancient monuments remain a mystery. They have been the subject of much archæological speculation and are generally considered to be the Celtic monuments of a Druidical cult, traces of which exist in some of the primitive customs of the natives.

In the year B.C. 56, from these shores Cæsar watched the naval victory of Decimus Brutus the younger over the Veneti in the Bay of Quiberon. The Romans occupied Brittany during five centuries, and considerable remains of Gallo-Roman habitations, with interesting relics, have been excavated at the Bossenno, i.e. mounds, on the plain, 1 mile to the east of Carnac, and also at the base of the artificial Mont Saint-Michel. Consult: Galles, *Fouilles du Mont Saint-Michel en Carnac* (Paris, 1864), and *Tumulus et dolmens de Kercado* (Paris, 1864); Fouquet, *Des monuments celtiques et ruines romaines dans le Morbihan* (Paris, 1873); Lukis, *Chambered Barrows and Other Prehistoric Monuments in Morbihan* (London, 1875); Miln, *Excavations at Carnac* (2 vols., Edinburgh, 1877-81); Worsfold, "The French Stonehenge," in *British Archæological Association Journal*, Vol. IV. (London, 1898).

CAR'NALL, RUDOLPH VON (1804-74). A German mining engineer, born at Glatz (Silesia). He studied in Berlin in 1823-24, began an active connection with the mining industry in Upper Silesia, and by 1855 had risen to be a superintendent of mines and director of the general mining office in Breslau. In 1848 he assisted in founding the German Geological Society, and from 1849 to 1855 lectured at the University of Berlin on the science of mining engineering. He was a councilor in the mines and mining section of the Prussian Ministry of Commerce from 1854 to 1861. The *Zeitschrift für das Berg-, Hütten und Salinenwesen im preussischen Staate* was founded by him; and he rendered other important services to the development of German mining.

CARNARVON, or **CAERNARVON**, kär-när'von (Welsh, *Caer-yn-ar-Fon*, fort opposite Mona or Anglesey). A Parliamentary and municipal borough and seaport in north Wales, the capital of Carnarvonshire, situated near the south end of the Menai Strait, on the right bank of the Seiont, about 69 miles west of Chester (Map: England, B 3). The castle, which was begun in the reign of Edward I., about 1283, is generally considered the handsomest and most extensive mediæval fortress in the United Kingdom. It is built of red stone, and is an irregular oblong in shape. The outer walls, from 8 to 14 feet in thickness, containing a passageway, are fortified by thirteen embattled towers. In the Eagle Tower the first Prince of Wales (afterwards Edward II.) is said to have been born.

The town itself was once surrounded by walls and round towers. These walls, with several of the gates, still exist, and form a pleasant promenade. The streets are narrow, but regular, and at right angles to each other. The town is well lighted, and has a good water-supply. It is an important commercial centre. The harbor admits ships of 400 tons. The chief exports are copper, ore, coal, and slates, which are brought into the town by rail from the quarries in the neighborhood. There is also a great iron and brass foundry. There are manufactures of writing-slates, enameled slate slabs, and tobacco. Carnarvon is a bathing-place, and is much frequented by tourists, on account of its vicinity to the grandest scenery in north Wales. Population, in 1891, 9804; in 1901, 9760. Half a mile from Carnarvon are the remains of Segontium, or Caer Seiont, a Roman station or city. There is a Roman fort on the left bank of the Seiont, still almost complete. The Earl of Chester fortified the place in 1098. In 1294 the town and castle were burned and the English inhabitants massacred by the Welsh under Madoc, the son of Llewelyn. Consult Hartshorne, "Carnarvon Castle," *Archæological Journal*, Vol. VII. (London, 1850).

CARNARVON, HENRY HOWARD MOLYNEUX HERBERT, fourth Earl of (1831-90). An English Conservative statesman. He was born in London June 24, 1831, and succeeded to the peerage in 1849. Educated at Eton and Christ Church, Oxford, in 1852 he obtained a first class in classics, and, after taking his degree the following year, traveled through the Orient. In 1860, as a souvenir of the journey, he published a work entitled *The Druses of the Lebanon*. At his majority he took his seat in the House of Lords, and in 1858 Earl Derby made him Under Colonial Secretary. In 1859 he was elected high steward of Oxford University and created D.C.L. In 1866 he was appointed Colonial Secretary, and his policy met with the warmest approval. He framed a bill for the confederation of the British North American colonies, and had moved the second reading when he resigned office upon the Reform Bill of 1867, which he condemned as democratic and dangerous. On Disraeli's return to office, in 1874, Lord Carnarvon again became Colonial Secretary, but resigned in 1878. He was Lord Lieutenant of Ireland (1885-86), and died in London, June 28, 1890. He was the author of an address on *Berkshire Archæology* (1859): in 1869 edited *Reminiscences of Athens and the Morea, by the late Earl of Carnarvon*, his father, and published translations of the *Agamemnon* (1879), the *Odyssey* (1886), and *Prometheus Vinctus* (1893).

CARNARVONSHIRE. A maritime county in north Wales, bounded north by the Irish Sea, east by Denbigh, with the Conway between, south by Merioneth and Cardigan Bay, and west by Carnarvon Bay and the Menai Strait, the latter separating it from Anglesey (Map: England, B 3). Area, 563 square miles, of which one-half is in pasture and only one-fortieth in tillage. The surface is mountainous. The mineral products of Carnarvonshire are copper, lead, zinc, coal, roofing and writing slates, slabs, chimney-piers, and honestone. The slate-quarries employ many thousands of workmen. The chief branch of rural industry is the rearing of black cattle for the dairy and of small sheep. Wheat, oats, barley, and potatoes are raised in the valleys. The chief towns include Carnarvon (the county town), Bangor, Pwllheli, and Conway. Population, in 1891, 118,200; in 1901, 126,000.

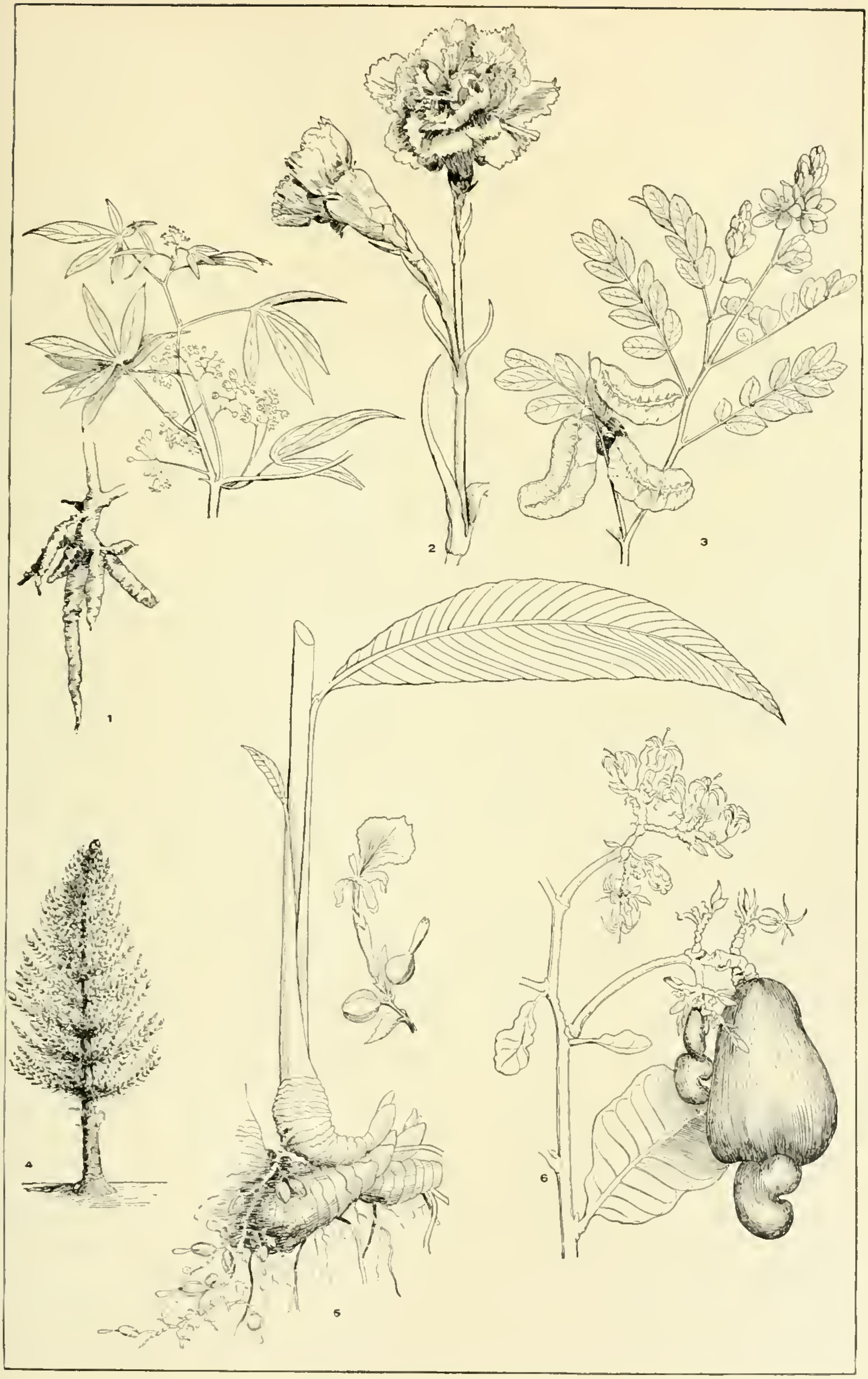
CARNAT'IC (from Skt. *Karnāta*, name of a people in southern India). A former political division of somewhat indefinite dimensions on the eastern or Coromandel coast of the peninsula of India. It is famous in history as the grand theatre of the struggle in the middle of the Eighteenth Century between France and England for supremacy in India. It was at that time ruled by the Nawab of Arcot, who was a vassal of the Nizam of Hyderabad. The region was annexed by the British in 1801.

CARNATION (Fr., Lat. *carnatio*, from *caro*, flesh). A double-flowering variety of the clove pink (*Dianthus caryophyllus*) and one of the most popular flowers of that family. It is a native of the south of Europe, and has been in cultivation for more than 2000 years. It is a semi-hardy perennial (generally cultivated as an annual in America) 2 to 3½ feet high, with a branching stem, opposite linear leaves, terminal flowers, and blossoming in England from June to August. The clove-like fragrance of the flowers gave to the plant its specific name *caryophyllus* (clove-tree, *Caryophyllus aromaticus*). Many varieties, with various forms and colors, are in cultivation. Red, white, pink, and yellow varieties predominate. The monthly, tree, or perpetual-flowering carnations are the varieties now so extensively grown under glass in the United States for winter cut flowers. These are propagated from cuttings taken from December to May, rooted in sand, transplanted to plats or pots, and kept in a cool house until danger from heavy frost is past, when they are set in the field.

Sandy loam soil heavily fertilized is preferred. The plants are set in rows 12 inches apart and 10 inches distant in the row when cultivated by hand, and in 3-foot rows when worked with a horse. If winter flowers are wanted, the rising shoots of the plants are regularly pruned back to 2 to 4 inches during the summer. In September the plants are lifted and transplanted to the forcing-house benches. The soil here is 4 to 5 inches deep, and consists usually of three-fourths loam and one-fourth well-rotted manure. The plants are set 8 to 12 inches apart each way, heavily fertilized, and watered frequently with liquid manure. The temperature of the carnation-house during the winter is maintained at 60° to 65° in the daytime and ten degrees lower at night. Instead of setting in benches, the plants are sometimes set in pots, and may either be forced at once or set in cold frames and carried over for spring flowering. Some 500 varieties of carnations, all of American origin, are now in cultivation in the United States. See FLORICULTURE.

Carnation Diseases.—Carnations are liable to a number of diseases, the more common and troublesome being anthracnose, rust, blight or spot, and a disease caused by the punctures of minute insects. The anthracnose (q.v.), which is caused by the fungus *Volutella*, is widespread, and causes grayish-brown spots on the leaves. Later the stems are invaded by the parasite, and the supply of nourishment for the plant cut off. Diseased cuttings will spread the infection,

CARNATIONS, ETC.



1. CASSAVA or MANIOC (Manihot utilissima).
2. CARNATION (Dianthus Caryophyllus).
3. SENNA (Cassia sp.).
4. CALAMITIES AS RESTORED.
5. CARDAMON SEED (Elettaria Cardamomum).
6. CASHEW NUT (Anacardium occidentale).

hence all such should be rejected. The rust is caused by *Uromyces caryophyllinus*, and may be recognized by the blisters on the leaves. Later the blisters are ruptured and the reddish-brown spores escape. A diseased plant cannot be cured, and should be dug out and destroyed. The spot, or blight, is due to the fungus *Septoria dianthi*. It may be recognized by the light-brown spots, which later bear black dots near their centre. The stems also are attacked and the plant is unable to perform its proper functions. All of these diseases may be prevented by the thorough use of Bordeaux mixture, copper carbonate solution, or other fungicide (q.v.). The disease caused by insect punctures may be recognized by the pellucid spots in the leaves. The name stigmonose has been lately given it. Anything keeping thrips (q.v.), etc., in check will prevent the disease. Great variation in liability to all the diseases is noticed in different varieties.

CARNAUBA (kär-nou'bä) **PALM** (Brazilian), or CARANAIBA PALM (*Copernicia cerifera*). A very beautiful species of South American palm. It ranges from the northern parts of Brazil to Argentina, and in some places forms vast forests. It attains a height of 20 to 40 feet, with a diameter of 8 inches; its timber is valuable, is used in Brazil for a great variety of purposes, and is exported for veneering. The fruit is black, and about the size of an olive; it is sweet, and is eaten both raw and prepared in various ways. Scales of wax cover the under side of the young leaves, and drop off when shaken. Being collected in this way, the wax is melted into masses, and is often used to adulterate beeswax. It is exported and used in the manufacture of candles. Starch is obtained from the stems of the trees, and sugar from the sap. The fibres obtained from the leaves are valuable, being used for cordage, mats, hats, etc. The tree withstands drought to a remarkable degree, and is said to flourish on slightly saline soil. It is hardy only in the warmest parts of the United States.

CARNAVAL DE VENISE, kär'nȧ'vȧl' de vȧ'nēz' (Fr., carnival of Venice). Originally a Venetian street air. It was heard by Paganini on one of his early tours through Italy (beginning 1805) and was elaborated by him into its present form. In Paris, on December 9, 1953, an opera by Ambroise Thomas was produced bearing this title, and having the original air as a motif of the overture.

CARNÉ, kär'nā', LOUIS MARCIEN, Count de (1804-76). A French publicist, born at Quimper. In 1839 he was elected to the Chamber of Deputies, and though opposed to M. Guizot's foreign policy, he accepted the presidency of the commercial department of foreign affairs in 1847, but lost this post after the Revolution of 1848. He became a member of the Academy in 1863. Carné was a frequent contributor to the *Revue des Deux Mondes* and other journals, and published numerous works, of which the best known are *Vues sur l'histoire contemporaine* (2 vols., 1833); *Etudes sur les fondateurs de l'unité française* (2 vols., 1856); *Etudes sur l'histoire du gouvernement représentatif en France, de 1789 à 1848* (2 vols., 1855); *L'Europe et le Second Empire* (1865); *Les états de Bretagne et l'administration de cette province jusqu'en 1789* (2 vols., 1868); and *Souvenirs de ma jeunesse au temps de la restauration* (1872).

CARNE'ADES (Gk. Καρνεάδης) (c.214-129 B.C.). A Greek philosopher, the founder of the New Academy. He was born at Cyrene, in Africa, and studied in Athens under Diogenes the Stoic, but attached himself to the Academy and opposed the dogmatism of the Stoa, setting up against their certainty of knowledge simple probability. According to him, the senses and understanding give no certain basis of knowledge, and therefore our inferences based on them are only probabilities which may not correspond to the real nature of things, and are therefore no certain tests of truth. On the ethical side, he held that these probabilities were a sufficient guide for life, for the common agreement in men's sensations and experiences must represent in some degree the truth. Carneades enjoyed a great reputation in Athens. In B.C. 155 he was sent with the Stoic Diogenes and the Peripatetic Critolaus on an embassy to Rome, where he attracted great attention by his eloquence. We hear that he argued before Galba and Cato the Censor, in praise of justice, and the next day undertook to disprove his arguments of the previous day, and so to establish his doctrine of the uncertainty of knowledge. To Cato such intellectual jugglery seemed dangerous, and he therefore had the ambassador dismissed, that the Roman youth might not be corrupted. Carneades left no writings behind him, with the exception of certain letters mentioned by Diogenes Laërtius to Ariarathes, King of Cappadocia. See NEW ACADEMY.

CARNEGIE, kär-nĕg'ĭ, ANDREW (1837—). An American manufacturer and philanthropist, born in Dunfermline, Fifeshire, Scotland. He came to the United States in 1848, and began his career as a weaver's assistant in a cotton-factory at Allegheny, Pa. Here his weekly earnings at first amounted to little more than one dollar. At the age of fourteen he became a telegraph messenger boy in the Pittsburg (Pa.) office of the Ohio Telegraph Company. He improved his spare time in learning to telegraph, and a few years later he entered the service of the Pennsylvania Railroad, and soon received a position as a telegraph operator. From this position he advanced by successive promotions to that of superintendent of the Pittsburg division of the system. It was during this period that he became interested in the organization of the Woodruff Sleeping Car Company, the success of which laid the foundation of his fortune, while careful investments in oil lands near Oil City, Pa., increased his means. During the Civil War he rendered valuable services to the War Department as superintendent of military railroads and Government telegraph lines in the East. After the war he entered actively into the development of iron-works of various kinds, and established at Pittsburg such important industries as the Keystone Bridge Works and the Union Iron Works. It was in 1868 that he introduced into this country the Bessemer process of making steel. In 1888 he was the principal owner of the Homestead Steel Works, and had a controlling interest in seven other large steel plants. His interests were consolidated in 1899 in the Carnegie Steel Company, which in 1901 was merged into the

United States Steel Corporation. In this year he retired from business.

Mr. Carnegie's benefactions have exceeded in amount those of any other American. In 1901 it was estimated that he had given away $40,000,000. Among his donations may be mentioned: to the Carnegie Institute, Pittsburg, $10,000,000; to New York City, for the establishment of branch libraries in the development of the public-library system, $5,200,000; to the Carnegie Institution, Washington, D. C., $10,000,000; to universities of Scotland, $10,000,000; to the fund for the benefit of the employés of the Carnegie Steel Company, $5,000,000; to the public library of Saint Louis, Mo., $1,000,000. A large number of libraries in the United States, Canada, and England owe their existence or their improvement to him. His publications include *An American Four-in-Hand in Britain* (1883); *Round the World* (1884); *Triumphant Democracy* (1886); *The Gospel of Wealth* (1900); and *Empire of Business* (1902).

CARNEGIE INSTITUTION. An institution for research founded by Andrew Carnegie. It was incorporated on January 4, 1902, for the promotion of study and research, with power (a) to acquire, hold, and convey real estate and other property necessary for its purposes and to establish general and special funds; (b) to conduct, endow, and assist investigation in any department of science, literature, or art, and to this end to coöperate with governments, universities, colleges, technical schools, learned societies, and individuals; (c) to appoint committees of experts to direct special lines of research; (d) to publish and distribute documents; (e) to conduct lectures; (f) to hold meetings; (g) to acquire and maintain a library; (h) and in general to do and perform all things necessary to promote the objects of the institution. The sum of $10,000,000 was transferred by Andrew Carnegie to a board of twenty-seven trustees chosen by himself. The trustees originally named were John S. Billings, New York; Grover Cleveland, New Jersey; William N. Frew, Pennsylvania; Lyman J. Gage, Illinois; Daniel C. Gilman, Maryland; John Hay, District of Columbia; Abram S. Hewitt, New York; Henry L. Higginson, Massachusetts; Henry Hitchcock, Missouri; Charles L. Hutchinson, Illinois; William Lindsay, Kentucky; Seth Low, New York; Wayne MacVeagh, Pennsylvania; D. O. Mills, New York; S. Weir Mitchell, Pennsylvania; William W. Morrow, California; Elihu Root, New York; John C. Spooner, Wisconsin; Andrew D. White, New York; Edward D. White, Louisiana; Charles D. Walcott, District of Columbia; Carroll D. Wright, District of Columbia; and the following ex-officio members: The President of the United States, the president of the Senate, the Speaker of the House of Representatives, the secretary of the Smithsonian Institution, and the president of the National Academy of Sciences. The purposes of the trust are to establish in Washington an institution which shall, with the coöperation of institutions now or hereafter established, there or elsewhere, in the broadest and most liberal manner encourage investigation, research, and discovery, show the application of knowledge to the improvement of mankind, provide such buildings, laboratories, books, and apparatus as may be needed, and afford instruction of an advanced character to students properly qualified to profit thereby. Among its aims are these: (1) To promote original research, paying great attention thereto as one of the most important of all departments; (2) to discover the exceptional man in every department of study, whenever and wherever found, inside or outside of schools, and enable him to make the work for which he seems specially designed his life work; (3) to increase facilities for higher education; (4) to increase the efficiency of the universities and other institutions of learning throughout the country by utilizing and adding to their existing facilities and aiding teachers in the various institutions for experimental and other work in these institutions as far as advisable; (5) to enable such students as may find Washington the best point for their special studies to enjoy the advantages of the museums, libraries, laboratories, observatory, meteorological, piscicultural, and forestry schools, and kindred institutions of the several departments of the Government; (6) to insure the prompt publication and distribution of the results of scientific investigation, a field considered highly important. The institution was duly organized on January 29, 1902, when the following officers were chosen: President, Daniel C. Gilman; chairman of the board of trustees, Abram S. Hewitt; vice-chairman, John S. Billings; secretary, Charles D. Walcott, and an executive committee, consisting of John S. Billings, Daniel C. Gilman, Abram S. Hewitt, S. Weir Mitchell, Elihu Root, Charles D. Walcott, and Carroll D. Wright. The headquarters of the institution is in Washington, D. C.

CARNE'IA. See Greek Festivals.

CARNEIRO DE CAMPOS, kär-nā'rô dā käm'pôsh, José Joaquim (1768-1836). A Brazilian politician, born at Bahia. He graduated at the University of Coimbra, Portugal, became a member of the Brazilian Constituent Assembly in 1823, and in the same year was appointed Minister of the Interior by the Emperor, Dom Pedro I. In 1826 he became Senator from the Province of Bahia, and attained distinction as a debater on the important constitutional questions then under discussion. After the abdication of Dom Pedro I., he was appointed one of the three members of the provisional regency.

CARNEIRO LEÃO, kär-nā'rô lâ-oux', Honorio Hermeto (1801-56). A Brazilian politician, born at Jacahy. He studied law, attained distinction in his profession, was elected deputy in 1830, and in 1832-33 was Minister of Justice. From January 20, 1843, to February, 1844, he was Prime Minister, and again held the same office from 1854 until his death. He became President of Rio de Janeiro in 1841 and of Pernambuco in 1849. For the greater part of his political career he was known as a leader of the so-called "New Conservative" Party.

CARNELIAN, or **CORNELIAN** (Fr. *cornaline*, from Lat. *cornu*, horn. *Carnelian* is a form influenced by popular etymology with Lat. *caro*, flesh). A semi-transparent variety of chalcedony, varying in color from a pale to deep red. Inferior varieties are yellow and brown. The finest specimens are red, and come mostly from Cambay and Surat, in India. Red and yellow specimens of excellent quality have also been found at Tampa Bay, Fla., and near Cape Split, Nova Scotia. The carnelian from India is found in nodules of a blackish olive color, which turn red only after exposure to the heat of the sun for two years, the color gradually becoming brighter and deeper. Artificial heat is sometimes substituted for that of the sun's rays, but with less satisfactory results, as the stones frequently crack and seldom acquire a brilliant lustre. The blood-red varieties were greatly valued by the ancients, who executed beautiful engravings in carnelian. Among the extant specimens of this kind may be mentioned the portrait of Sextus Pompeius in the Berlin collection, that of Helen in Vienna, and several in the British Museum. The carnelian is still used by lapidaries for seal rings.

CARNERI, kär-nä′rê, BARTHOLOMÄUS VON (1821—). An Austrian politician and writer, born at Trent. In 1870 he was elected to the Austrian Chamber of Deputies, where, as a prominent Liberal, he retained a seat until 1890. His publications include, besides some political monographs, *Gefühl, Bewusstsein, Wille* (1876); *Grundlegung der Ethik* (1881); *Der moderne Mensch* (1890: 5th ed., 1901); and a volume of *Gedichte* (2d ed., 1850).

CARNICER, kär′nê-thâr′, DON RAMON (1789-1855). A Spanish composer, born near Tarrega, in Catalonia. He studied in Barcelona under Francesco Queralt and Carlos Bagnor, organist in the cathedral there. Because of the disorganized condition of Spain, due to the invasion of Napoleon, he left his native country and did not return to it permanently until 1828, when he was made director of the Royal Theatre in Madrid. From 1830 to 1854 he was professor of composition at the Royal Conservatory in Madrid. Among the works of Carnicer are *Adela de Lusignano; Elena y Constantino; El Colon, Elena y Malvina* (1829); and *Colombo* (1831). Besides these, he composed a good deal of church music, and many songs and melodies of distinctly national character.

CAR′NIFEX FERRY. A ferry across the Gauley River, near the mouth of Meadow River, in Nicholas County, W. Va. Near here, on September 10, 1861, during the Civil War, an engagement occurred between a Federal force under General Rosecrans and a Confederate force of 5000 under General Floyd. The former lost 17 killed and 141 wounded, while Floyd reported his casualties at only 20. During the night, however, Floyd retreated across the Gauley. Consult Johnson and Buel (editors). *Battles and Leaders of the Civil War*, Vol. I. (New York, 1887).

CAR′NIN (Lat. *caro*, flesh), $C_7H_8N_4O_3$. An organic substance allied to xanthin and found in meat extract, from which it may be obtained in the form of small, irregular crystals, sparingly soluble in cold, but readily in hot water. To prepare carnin from meat extract, the latter is dissolved and the solution is precipitated with a moderate quantity of baryta water, filtered, and basic acetate of lead is added to the filtrate: the lead precipitate is carefully extracted with hot water, and the solution thus obtained is treated with sulphuretted hydrogen to precipitate the lead; on filtering and concentrating the solution, carnin crystallizes out after some time. By the action of chlorine or of nitric acid, carnin may be readily converted into apoxanthin.

CAR′NIO′LA (Ger. *Krain*). An Austrian crownland, bounded by Carinthia and Styria on the north, Croatia on the east, Croatia and Küstenland on the south, and Küstenland on the west (Map: Austria, D 4). It covers an area of 3856 square miles. The surface of Carniola is mostly mountainous. The northern part is traversed by a portion of the Karawanken chain, while on the west it receives the Julian Alps, which form the chief mountain chain of Küstenland. Carniola belongs chiefly to the basin of the Save, which crosses its northern portion. In the south the main stream is the Gurk. There are not a few mountain caves and charming lakes. Although the proportion of productive land is very considerable (over 95 per cent.), arable land is scarce in Carniola on account of the numerous forests. The production of cereals is light. Vegetables constitute a very prominent element in the diet of the inhabitants. Silk, flax, and grapes are cultivated, and the exploitation of the forests is carried on extensively. The chief mineral is quicksilver, the mines of Idria being considered the most productive in Europe, with the exception of the Almaden mines in Spain. The other prominent minerals are iron and brown coal. The chief manufacturing industries are the weaving of textiles and the making of leather goods. The trade is largely transit. Nearly 300 miles of railway lines, with Laibach, the capital, as the centre, facilitate the commerce of the crownland. The Diet of Carniola is composed of the Bishop of Laibach, ten representatives of the landed aristocracy, eight representatives of the towns and industrial centres, two representatives of the chambers of commerce and industry of Laibach, and sixteen representatives of the rural communities. In the Lower House of the monarchy Carniola is represented by eleven delegates, two from the landed aristocracy, three from the towns, five from the rural communities, and one elected by the people at large. For internal administration, the crownland is divided into eleven districts, and the city of Laibach. There are about 350 elementary schools (283 Slav), attended by over 75,000 children, or 89 per cent. of the total school population.

Carniola had a population of 508,348 in 1900, against 498,958 in 1890, showing an increase of 1.9 per cent. for the decade. Nearly 94 per cent. of the people are Slovenes, and the remainder consists of Germans, Serbo-Croatians, and Italians. Almost the entire population belongs to the Roman Catholic Church. The capital, Laibach, has a population of over 36,000.

Carniola received its present name from the Slavonic Wends, who occupied the region after the fall of the Roman Empire. Charlemagne conquered it and gave it to the Dukes of Friuli. From 972 it had margraves of its own, sometimes called dukes, who possessed, however, only a part of the country. On the extinction of the male line of the margraves, part of the territory passed to the Dukes of Austria in the Thirteenth Century, and the remainder was acquired by them in the Fourteenth. From 1809 to 1813 it formed part of the French province of Illyria, and in 1849 it became a crownland.

CARNIVAL (It. *carnevale*, or *carnovale*; probably from Med. Lat. *carnelevamen*, a release from the flesh, but commonly derived by popular etymology from Lat. *carni vale*, farewell to flesh, or It. *carne vale*, farewell, flesh). The days of revelry immediately before the beginning of Lent. The origin of this celebration is almost as obscure as the derivation of the name, for which several theories have been suggested, none of them entirely satisfactory. There is very little doubt that the custom is in a sense a survival of the old Roman festival of the Lupercalia (q.v.), which was held at the same season of the year, and that the Church, as in so many other instances (see BONFIRE), attempted to regulate and sanctify what it could not entirely suppress. The same spirit of compromise marked the attitude of the popes toward it throughout the Middle Ages. As secular rulers they were disinclined altogether to suppress an observance which promoted the material prosperity of the city; yet as pastors of souls they could not look with complacency upon the frequently unrestrained license attending its celebration. Several of the more spiritually minded popes made a practice of spending the season in strict retirement, to avoid witnessing the disorders which they could not altogether prevent: the time, which originally extended from the feast of the Epiphany (January 6) to Ash Wednesday, was restricted to eight and finally to three days; and a number of minute regulations have always reminded the populace of the existence of a superior authority. The celebration was usually suspended in the years of jubilee (q.v.), and the funds generally expended on the carnival diverted to the entertainment of needy pilgrims, the Jews being compelled to contribute to that purpose the tax laid upon them for the purposes of the carnival.

In modern times Rome has continued the principal seat of these observances, although other Italian cities, notably Venice, have displayed great splendor, and the Parisians, never averse to an occasion for merrymaking, indulge in elaborate revels. A long-established custom in Paris has been to lead in the procession a fat ox (*bœuf gras*, whence *Mardi Gras*) followed in a triumphal car by a child called 'the king of the butchers.' Otherwise few of the traditional festivities are kept alive, except the throwing of *confetti* or sweetmeats and flowers, the blowing of horns, the masked balls (see MASQUERADE), and the parades of allegorical chariots. In Italy after the gayeties of the last day, *Mardi Gras*, the death of the carnival is symbolized by the burning of a huge effigy; and the crowds in the streets carry lighted tapers (*moccoletti*), each endeavoring to extinguish those of his neighbors and keep his own alight. In the United States the principal observance of *Mardi Gras* is that which has been carried out in New Orleans with great pomp and splendor since 1857. On this day the whole city is turned over to the rule of 'King Rex, who passes through the streets escorted by his body-guard, the mystic krewe of Comus,' and various military and visiting organizations. In the evening occurs the great street pageant, in which are displayed elaborate tableaux, placed on moving forms and brilliantly illuminated. These represent noted scenes of history, poetry, or fiction, and are constructed at great expense and with artistic elegance. All the arrangements are under the control of societies composed of the best-known professional and business men of the city. Consult: Rosières, *Histoire de la société française au moyen âge* (Paris, 1880); Story, *Roba di Roma* (London, 1862). Byron's *Beppo*, and the second part of Goethe's *Italienische Reisen*, also contain vivid descriptions of the Italian carnival of a century ago. See BLUE MONDAY; COLLOP MONDAY; SHROVETIDE.

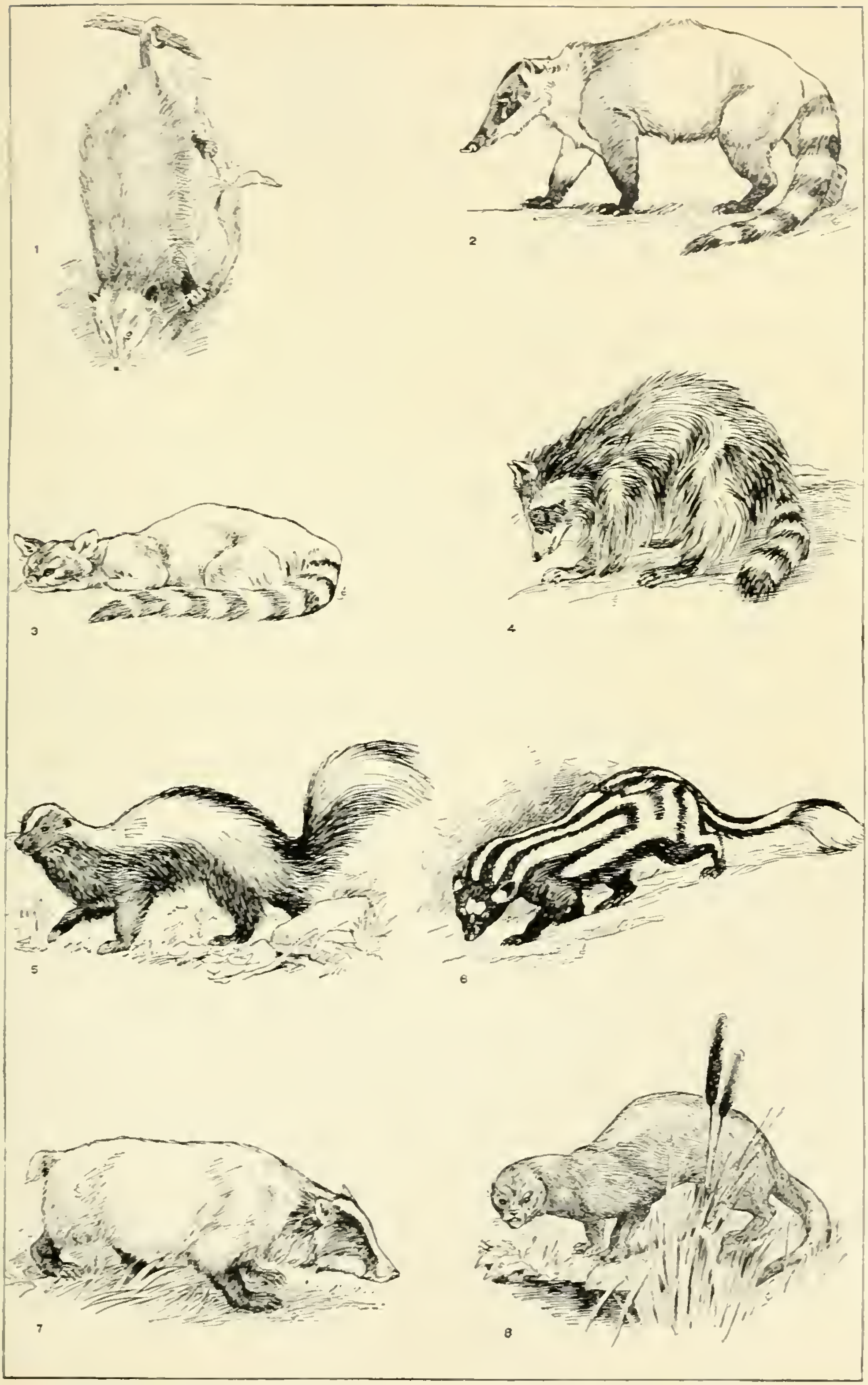
CARNIV'ORA (Lat. neut. pl., from *caro*, flesh + *vorare*, to devour). An order of mammals, more or less efficiently adapted for predaceous life, and including most of the forms popularly known as beasts of prey. Not all animals carnivorous in diet are carnivora in structure, for the dasyure or Tasmanian devil is a marsupial, and the blood-sucking Desmodus is a bat. Nor are all the members of the order Carnivora in diet purely carnivorous, for the polar bears eat grass greedily, the ratels are very partial to honey, and many forms eat fruits, berries, insects, mollusks, or crustaceans in a highly omnivorous manner.

The carnivora dwell in all parts of the world except New Zealand and Australia, where their work is done by flesh-eating marsupials. They vary in size from the ermine which one may hide in his pocket to bears that may weigh 2000 pounds; and are fitted for the chase of almost every variety of living creature, not even the oceanic birds (in their breeding-places) being exempt from their ravages. They thus serve as a check upon the otherwise too rapid multiplication of herbivores, rodents, etc., which relieved from them would soon swarm excessively. Their relations with mankind are mainly those of enmity. He pursues some for sport, others for their fur, and others in order to get rid of neighbors dangerous to him or his domestic animals. The carnivora therefore disappear to a great extent in areas of civilization, the effect of which is felt in the increase of such pests as mice and gophers; but in some parts of the world wild beasts carry on even warfare, tigers and leopards alone killing many thousands of human beings and cattle annually. From this class, however, mankind, has derived two of his most valued domestic pets—the dog and cat.

GENERAL CHARACTERS. The dentition of most carnivora is very characteristic. There are in each jaw six pointed cutting teeth, two strong, sharp, recurved canines, and molar teeth often adapted for cutting. The skull is short and dense. The lower jaw moves up and down in a deep, transverse, semi-cylindrical groove, and there are deep hollows on the sides and prominent crests on the roof of the skull for the attachment of the powerful muscles which work the jaw. As one would expect in animals with vigorous habits of life, the convolutions of the brain and olfactory lobes are well developed. The toes are clawed, with more or less pointed nails. In contrast to herbivorous animals, the stomach is simple, and the cæcum is either absent or small. Vagrant, predatory habits, a flesh diet, fierce disposition, and high intelligence are ordinal characteristics. While most of the families are more abundant in the tropics than elsewhere, some are more generally inhabitants of temperate regions, and a few are especially common in the Far North.

CLASSIFICATION. Two suborders are distinguished—*Fissipedia*, the typical terrestrial carnivora, and *Pinnipedia*, the aberrant, aquatic forms. The second suborder, with its numerous adaptive characters, has doubtless been derived from the first, and is divided into three families, with about fifty species: (1) Otariidæ, or eared seals, nearest to the typical carnivora, and char-

AMERICAN MINOR CARNIVORES



1. OPOSSUM (Didelphys Virginiana).
2. RED COATI (Nasua rufa).
3. CACOMISTLE (Bassariscus astutus).
4. RACCOON (Procyon lotor).
5. SKUNK (Mephitis mephitica).
6. STRIPED SKUNK (Spilogale putorius).
7. BADGER (Taxidea Americana).
8. OTTER (Lutra Canadensis).

acterized by the presence of external ears. The sea-lions, sea-bears, sea-elephants, fur-seals, etc., are well-known examples. (2) Trichechidæ (or Rosmaridæ), the walruses (q.v.), of which only two species are known, characterized by the prolongation of the upper canine teeth into two powerful tusks. (3) Phocidæ, or earless seals, characterized by the absence of external ears and the lack of tusks; there are about ten genera and some twenty species.

Cuvier proposed to divide the typical carnivores into Plantigrades, walking on the entire sole (e.g. bears), and Digitigrades, walking on finger-tips (e.g. cats); but these functional differences are rendered useless by the multitude of transitional links connecting them, and it is more accurate and useful to divide the order into three sections, represented familiarly by bear, dog, and cat, and technically known as Arctoidea, Cynoidea, Æluroidea. The distinctions are based on certain features in the base of the skull, but are corroborated by other more general characteristics.

(1) *The Arctoidea*, which are less specialized and nearest the aquatic suborder, are composed of six families—namely, the fur-bearers (Mustelidæ), the bears (Ursidæ), the raccoons (Procyonidæ), and three small related families.

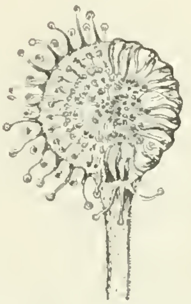
(2) *The Cynoidea* resemble the Arctoidea in most respects, and are composed of the single family Canidæ—dogs, foxes, etc.

(3) *Æluroidea* are the most specialized of carnivores, represented by cats, civets, etc., of which there are six families. The whole order of Carnivora embraces about 300 living species.

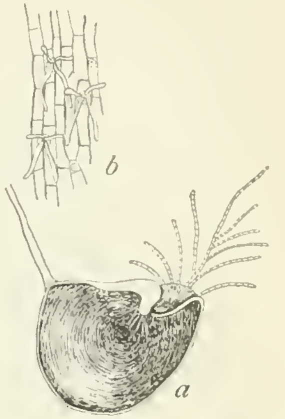
Pedigree and History. The fossil history of carnivora is of great interest, for not only have some remarkable forms like the sabre-toothed tiger (Machærodus) been unearthed, but the various families are linked together, as the cats and civets, by Proviverra, and the ancestors of at least the cats and the dogs are found in primitive generalized carnivores, such as Miacis, Oxhyæna, and Arctocyon. The group affords beautiful illustration of increasing and of divergent specialization, as illustrated in the passage from primitive forms to the lion on the one hand, and to the seal on the other. As to the relations of the carnivora to other orders of mammals, speculation is rife, but firmly based conclusions are hard to find. Looking backward, some naturalists have discovered affinities with the marsupials; while others, looking forward, have, with more abundant evidence, regarded the primitive carnivores as ancestral to Insectivora, and through them to Cheiroptera. And now there seems to be some evidence of not very distant relationship between Carnivora and Primates.

Bibliography. Consult authorities referred to under Mammalia; Cat; Dog; Bear, etc.

CARNIV'OROUS PLANTS. A peculiar group of plants, part of whose food consists of animals, especially insects, captured by various contrivances, hence called also 'insectivorous plants.' Most of these plants live in undrained swamps, where the soil is poor in nitrogen, and it is believed by many that the carnivorous habit is thus a decided advantage to the organism. The sundew (*Drosera*) is one of the commonest and most interesting of the group. The leaves bear glandular hairs, which secrete a sticky glistening substance. If an insect alights on the leaf it is held fast by the sticky substance, and the neighboring glandular hairs move toward it and press against it. The glands contain digestive substances, which act upon the body of the insect, and convert it into materials that can be absorbed and utilized as food. In the Venus-flytrap (*Dionœa*) the two halves of the leaf close suddenly, entrapping the insect. In the pitcher-plants (*Sarracenia, Nepenthes*, etc.), insects walk down the inner surface of the pitcher-like leaf and are prevented from escaping by the hairs that point downward. The aquatic bladderwort (*Utricularia*) has a sort of eel-trap device for entrapping insects. Consult: Darwin, *Insectivorous Plants* (London, 1875).

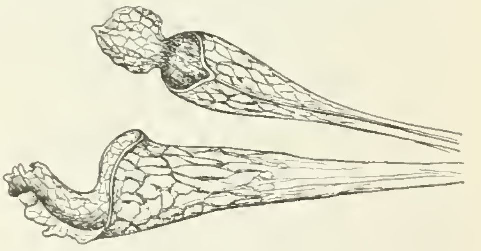


A leaf of the Sundew (Drosera), showing the tentacles which capture insects; the tentacles at the right illustrate how they bend in toward an insect which has alighted on the leaf.



a. A bladder of the Bladderwort (Utricularia). Insects are captured here after the fashion of an eel-trap.

b. Hairs (supposedly with digestive functions) within the bladder of Utricularia.



Pitcher-like leaves (ascidia) of the Pitcher-Plant (Sarracenia). Insects are often present in the liquid within the ascidia.

CARNOCHAN, kär'no-kan, John Murray (1817-87). An American surgeon, born in Savannah, Ga. He was educated at Edinburgh University and at the College of Physicians and Surgeons of New York, and in 1847 began practice in New York. Dr. Carnochan rapidly rose to the first rank among practicing physicians and surgeons, and acquired great celebrity for the boldness and success of his operations, such as the removal of the lower jaw; the cure of elephantiasis by ligature of the femoral artery; excision of the ulna while preserving to the arm most of its functions; amputating the thigh at the hip-joint, and particularly for removing, in case of neuralgia, the entire trunk of the second branch of the fifth pair of nerves. Dr. Carnochan added much to the renown of American surgery. He was professor of the principles and practice of surgery in the New York Medical College, and health officer of the Port of New York. Besides numerous monographs of value on subjects connected with his profession, he published *Treatise on Congenital Dislocations* (1850), and *Contributions to Operative Surgery* (1877-86).

CARNOT, kär′nō′, Lazare Hippolyte (1801-88). A French politician and journalist, the son of the 'Organizer of Victory.' He was born at Saint Omer, April 6, 1801. He studied for the law, but was debarred from practice for refusing to take the oath of allegiance to the Bourbons. Turning to journalism, he soon made a name for himself as a follower of Saint-Simon and his school, and became editor of *Le Producteur*, a radical journal of the day, but after the July Revolution forsook Saint-Simonism to a certain extent. In 1839 he entered the Chamber of Deputies as a representative from Paris and remained until 1848, voting with the extreme Left. After the February Revolution he accepted the post of Minister of Public Instruction, but held it only a few months. Elected to the Legislative Assembly in May, 1850, he took his place among the Republicans opposed to the schemes of Louis Napoleon. After the coup d'état he refused to swear allegiance to Napoleon, and though several times elected to the Legislative Assembly, did not take his seat until 1864. In 1869 he was defeated in the elections by Gambetta and by Henri Rochefort, but in 1871 he was chosen deputy from Seine-et-Oise. Made a life Senator in 1875, Carnot took a prominent part in the debates of the Upper House, and spoke for the last time in 1888, a few days after his son Sadi had been elected President of the Republic. He died March 16, 1888. He was the author of numerous magazine articles and reviews, the most important being *Exposé de la doctrine Saint-Simonienne* (1830); *Mémoires sur Carnot, par son fils* (2 vols., 1861-64); *La Révolution française* (2 vols., 1867); *Lazare Hoche* (1874); and, with M. d'Angers, *Mémoires de Bertrand Barère* (4 vols., 1842-43). For his biography consult the *Proceedings* of the Académie des Sciences, Morales et Politiques (Paris, January, 1894); also Hubbard, *Une famille républicaine: les Carnot* (Paris, 1888).

CARNOT, Lazare Nicolas Marguerite (1753-1823). A French strategist and mathematician. He was born at Nolay, and became, in 1791, a member of the Legislative Assembly from Pas-de-Calais. In the Convention he voted for the death of Louis XVI. He was elected to the Committee of Public Safety, intrusted with the chief direction of military affairs, and greatly contributed to the success of the French arms. He displayed extraordinary ability in this position, alike as a strategist and as an organizer. He created fourteen armies, placed them under the command of competent generals, and inspired the troops with an ardor which made them irresistible. Though he endeavored to restrict the power of Robespierre, he was impeached with others, after the Reign of Terror, but the charge was dismissed. Carnot became a member of the Directory in 1795, but having opposed the extreme measures of Barras, his colleague, he was suspected of being a royalist and sentenced to deportation in 1797. Having escaped to Germany, he wrote his famous defense, in which he laid bare the character of his associates in the Directory. The Eighteenth Brumaire brought him back to Paris. Bonaparte made him Minister of War in 1800. In this office he helped, by his energy, skill, and fertility of administrative resource, to achieve the brilliant results of the Italian and South-German campaigns; so that to him was given the name of 'Organizer of Victory.' Being unable to agree with Bonaparte, he resigned in the same year. In 1802 he became a member of the tribunate, in which capacity he voted against the establishment of the consulate for life and particularly against an empire. When the tribunate was abolished, he retired to private life and devoted himself to his studies. But when fortune ceased to favor Napoleon he placed his services at his command in 1814. The command of Antwerp was given to him, and the city was heroically defended. During the Hundred Days he held office as Minister of the Interior. The title of Count was conferred upon him, but he never bore it. After the second restoration he withdrew to Warsaw, and from thence to Magdeburg, where he died, August 3, 1823. Carnot's chief contribution to mathematical science is a class of general theorems on the projective properties of figures, which later formed the basis for the important works of Poncelet and others. Among his numerous writings on mathematics and military tactics are *Essai sur les machines en général* (1786); *Réflexions sur la métaphysique du calcul infinitésimal* (1797); and *Géométrie de position* (1803). Consult Arago, "Eulogy of Carnot," in Vol. I. of Arago's *Œuvres complètes* (Paris, 1854).

CARNOT, Marie François Sadi (1837-94). President of the French Republic from 1887 to 1894. He was the son of Lazare Hippolyte Carnot, and was born at Limoges, August 11, 1837. He received a scientific education, became an engineer, and advanced rapidly in his profession, acquiring a considerable reputation as the constructor of the large tubular bridge at Collonges-sur-Rhône. In 1870 he was stationed as Government engineer at Annécy and in 1871 Gambetta, who was then Minister of the Interior, made him the prefect of the Department of Seine Inférieure. In this capacity he rendered important services to the Government, but after the capitulation of Paris resigned his office and sat as a deputy from Côte d'Or in the National Assembly. There he took a prominent part in all discussions concerning the future form of government for France, voting always with the Republicans of the Left, for whom he acted as secretary. He became a member of the new Chamber of Deputies in 1876, and in 1877 was secretary to the Chamber, besides being prominent in connection with the Public Works Committee. In 1880-81 he was Minister of Public Works, and held the same office again in 1885, in the Brisson Ministry, in which he later acted as Minister of Finance. On December 3, 1887, he was elected to succeed Grévy as President of the Republic. In the performance of the high functions of this office, Carnot won the respect of all by his tact and ability. He passed unscathed through the Panama disclosures of 1892. His term of office was almost over when he was stabbed by an Italian anarchist named Caserio, in Lyons, and died the next day, June 25, 1894. He was succeeded as President by Casimir-Périer. Consult Hubbard, *Une famille républicaine: les Carnot* (Paris 1888).

CARNOT, NICOLAS LÉONARD SADI (1796-1832). A French physicist, to whose early researches and theories must be ascribed the beginning of the modern science of thermodynamics (q.v.). He was born in Paris, the son of Lazare Nicolas Marguerite Carnot. He entered the Polytechnic School in 1812, from which he passed into the corps of engineers, where he served until 1828. Working in this capacity, he had time and opportunity for scientific research, and in 1824 published his famous work, *Réflexions sur la puissance motrice du feu*, in which is described his cycle and reversible engine. Carnot's work was based on the theory that heat was a substance, 'calorie,' but so perfect was his reasoning that the theory required but few modifications to adapt it to the dynamical theory, which was later accepted, even by Carnot himself. According to Carnot, the amount of work done by a heat-engine depends on the amount of heat transferred and the difference in temperature between the source of heat and the receiver; work can be done only when heat passes from a warmer to a colder body. This is, in substance, the second law of thermodynamics, enunciated by Clausius in 1850, which stated that heat cannot of itself pass from a colder body to a hotter one, nor can it be so made to pass without any inanimate material mechanism; and no mechanism can be driven by a mere simple cooling of any material object below the temperature of surrounding objects. In order to study the efficiency of the steam-engine, Carnot devised a reversible engine where the amount of energy produced and heat applied could be investigated under ideal conditions. Carnot also appreciated the important principle now known as conservation of energy, stating that motive power is in quantity invariable in nature; it is, correctly speaking, never either produced or destroyed. Carnot's work was greatly extended and adapted to modern theories by Sir William Thomson, who published important papers in 1848 and 1849 which indicated that from these researches could be evolved the absolute thermodynamic scale of temperature. Carnot's great essay was printed in German, in *Ostwald's Klassiker*, No. 37 (Leipzig, 1892), and an English translation has been made by Prof. R. H. Thurston, to which was appended an *Account of Carnot's Theory*, by Lord Kelvin (New York, 1890).

CARNUN'TUM (Lat., from the Celtic). An ancient town in Upper Pannonia, on the Danube, a few miles east of Vienna, founded by the Celts, but at an early period a Roman post. Marcus Aurelius resided here for three years, during his wars with the Marcomanni. In the Fourth Century Carnuntum was destroyed by German invaders. It was afterwards rebuilt, and finally destroyed in the Magyar wars of the Middle Ages.

CARO, kâr'ō. A village and county-seat of Tuscola County, Mich., 32 miles east by south of Bay City, on the Cass River, and on the Michigan Central Railroad (Map: Michigan, K 5). It is in an agricultural country, adapted particularly to the cultivation of sugar-beets, and has industrial interests represented by flour-mills, grain-elevators, a beet-sugar refinery, lumber-mills, brick and tile works, a foundry and machine-shop, shoe, steel horse-collar, and telephone factories, marble-works, etc. Population, in 1890, 1701; in 1900, 2006.

CARO, kä'rō, ANNIBALE (1507-66). An Italian poet, best remembered for his felicitous translation of Vergil's *Æneid*. He was born at Civitanova, in Ancona; became at an early age tutor to the sons of Luigi Gaddi, in Florence; and in 1543 entered the service of Pier Luigi Farnese, nephew of Paul III., who sent him on numerous embassies, among others to the Emperor Charles V., in Flanders. After the death of Pier Luigi, Caro served successively the Duke Ottavio Farnese and the latter's brothers, the Cardinals Ranuccio and Alessandro, with whom he remained until his death, in 1566. Caro numbered among his friends many of the best-known men of letters of his day—Molza, Salviati, Vasari, and Tansillo. He was an accomplished letter-writer, and his *Lettere familiari* are not only full of interest, but have often been reprinted as models of style. One of his most famous poems is a panegyric upon the House of Valois, written at the request of Cardinal Alessandro, which was the cause of a bitter and protracted controversy with a certain Castelvetro, resulting in the death of one of Caro's supporters and in Castelvetro's banishment. Caro's felicitous translation of the *Æneid* was begun, he tells us, "in jest, and only as an experiment," but he continued it for the pleasure of "making trial of the language in comparison with Latin." The translation, which remained unfinished, is rather a skillful paraphrase than a faithful rendering; but, like all his writings, bears the stamp of a cultured and polished style. The best editions of Caro's works were published in Venice (1757), in Milan (1806), and a volume of selected works appeared in Florence (1864).

CARO, kä'rō', ELME MARIE (1826-87). A French philosopher, born in Poitiers. He was appointed professor of philosophy at the Sorbonne in 1864, and elected to the Académie in 1874. His writings, many of them in opposition to modern positivism, comprise *Etudes morales sur le temps présent* (1855; 3d ed., 1875), *L'idée de Dieu et ses nouveaux critiques* (1864; 7th ed., 1883), and a study of Hartmann, Schopenhauer, and Leopardi in *Le pessimisme au XIXe siècle* (1878).

CARO, kä'rō, JAKOB (1836—). A German historian. He was born in Gnesen, and after studying in Berlin and Leipzig was professor of history in Jena until 1869, when he accepted a similar chair at the University of Breslau. His publications, which deal chiefly with Polish and Hussite history, include the continuation of Röpell's *Geschichte Polens* (3 vols., II.-V., 1863-88), published in Ukert and Heeren's *Geschichte der europäischen Staaten*; *Das Interregnum Polens im Jahre 1587, und die Parteikämpfe der Häuser Zborowski und Zamojski* (1861); *Liber Cancellariæ Stanislai Ciolek, Ein Formelbuch aus der hussitischen Bewegung* (2 vols., 1871-74); *Aus der Kanzlei Kaiser Sigismunds* (1879); and *Beata und Halszka, Eine polnisch-russische Geschichte aus dem 16. Jahrhundert* (1883).

CAR'OB, Algaroba, or Locust-Tree (It. *carrubo*, from Ar. *kharrūb*, bean pods) (*Ceratonia siliqua*). A tree of the natural order Leguminosæ, a native of the countries around the Mediterranean Sea, in size and manner of growth much resembling the apple-tree, but with abruptly pinnate, dark, evergreen leaves, which have two or three pairs of large oval leaflets. The flowers are destitute of corolla; the fruit is a brown, leathery pod 4 to 10 inches long and an inch or so wide, a little curved, and containing gummy pulp, of an agreeable, sweet taste, in which lie a number of shining brown seeds, somewhat resembling small flattened beans. The seeds are bitter and of no use, but the sweet pulp renders the pods an important article of food to the poorer classes of the countries in which the tree grows, as they contain as much as 60 per cent. of sugar. They are very much used by the Moors and Arabs. They are also valuable as food for horses and cattle, for which they are much employed in the south of Europe, and have of late years begun to be extensively imported into Great Britain under the name of locust-beans or Saint John's bread. The Arabs make of the pulp of the carob a preserve like tamarinds, which is gently aperient, and also a kind of liquor. The carob-tree is too tender for the climate of Great Britain. Its introduction into the north of India has been recommended as an important addition to the resources of that country and a valuable safeguard against famine. At the California Experiment Station the tree is highly thought of for its shade. It grows well in dry, rocky situations, and is considered a valuable acquisition. It will not stand frost. The product is extremely abundant, some trees yielding as much as 800 or 900 pounds of pods. The wood is hard and much valued, and the bark and leaves are used for tanning. The locust-tree (q.v.) of America is quite distinct from this.

CARO'BA. See Jacaranda.

CAROL (OF. *carole*, from Bret. *koroll*, dance, Gael. *carull*, melody, from *car*, bar of music, Ir. *car*, a turn, ultimately, perhaps, connected with Ir. *carr*, cart, Lat. *currus*, cart). In the stricter sense, a popular religious song intended to form part of the rejoicings connected with the great Christian festivals. The kinship of the earlier English carols with similar French compositions is evidenced by the frequent recurrence in them of the refrain 'Nowell,' a variant of the Fr. *Noel*, Christmas (Lat. *natale*, birthday); though they had a wide popularity in the Middle Ages on the Continent of Europe, they are especially associated with English tradition. Their use seems to have been at its height under the Tudors: the universal familiarity with them is shown by the specific prohibition in 1525, when Henry VIII. lay seriously ill, of "carols, bells, or merry-making." In 1562 license was given to Thomas Tysdale to print "certayne goodly Carowles to be songe to the glory of God." The Puritans, in their general onslaught on the observance of Christmas, when holly and ivy were made seditious badges, attempted to abolish them; but they came back with the Restoration, and in 1661 appeared *The New Carols for the Merry Time of Christmas, to Sundry Pleasant Tunes*. To this day it is the custom in many parts of England for troops of men and boys, known as 'waits,' to go about the villages for several nights before Christmas, singing carols in the open air. As a rule, the best carols are the oldest, although one of the most popular, "While Shepherds Watched Their Flocks by Night," was composed in 1703 by no better a poet than Nahum Tate, and the ancient spirit has been successfully caught in recent times by Swinburne, William Morris, and John Mason Neale. The older carols, usually set to pleasing and not difficult melodies, have the characteristics of popular poetry in general. They are simple, picturesque, and often childlike in their *naïveté* to the point of seeming to persons of less unsophisticated training to border on irreverence. A manuscript of the Fifteenth Century now in the British Museum (ed. Thomas Wright, London, 1847), contains a number of the most famous early carols. The best collection, however, of both the ancient and modern types is *Christmas Carols, Old and New* (London, 1874), the words edited by H. R. Bramley, and the music by Sir John Stainer.

CAROLAN, kăr'ô-*lan*, or **O'CAROLAN**, ô-kăr'ô-*lan*, Turlogh. See O'Carolan, Turlogh.

CAROLANO, kä'rô-lä'nô. A wild Malayan people in the mountains of Negros Island. See Philippines.

CAROLINA, kä'rô-lē'nȧ, La. The capital of a district in the Province of Jaén, Andalusia, Spain, on the southern range of the Sierra Morena, 36 miles northeast of Jaén. It has lead and silver mining industries, vineyards, and olive plantations. The inhabitants, descendants of South Germans, who settled here in 1780 under the auspices of Count Olavides, the favorite of Charles III., exhibit an interesting assimilation, their origin being easily discernible, although the Teutonic language has been replaced by the Spanish. Population, 1901, 9756.

CAROLINA, kä'rô-lē'nȧ, Maria (1752-1814). A daughter of Francis I., Emperor of Germany, and Maria Theresa of Austria, and Queen of Naples by her marriage with Ferdinand IV. in 1768. She had great influence with the King, brought about the appointment of Sir John Acton as Prime Minister in 1784, and caused the King, in 1798, to join the coalition against France, the consequence of which was the marching of the French upon Naples (1799) and the flight of Ferdinand and Carolina. After returning to Naples, Carolina again conspired against Napoleon, and, with her husband, was, in 1806, dethroned and succeeded by Joseph Bonaparte. She died in Vienna.

CAROLINA (kăr'ô-lī'nȧ) **ALLSPICE.** See Calycanthus.

CAROLINA PINK. See Spigelia.

CAR'OLINE, The. An American vessel, the seizure and destruction of which, off Grand Island, by a party of Canadians, on December 29, 1837, during the rebellion in Upper Canada, threatened to cause a war between the United States and Great Britain. The steamer had been used for carrying supplies to a party of insurgents on Navy Island, and Great Britain asserted in 1840 that its destruction was a legitimate act of war, while the United States repeatedly demanded redress on the ground that the Canadians had invaded its territory in time of peace. The difficulty came to a crisis in the course of the same year when a Canadian named McLeod, who had boasted of participating in the affair, was tried in New York. The British Ministry threatened war in case he were not released, but his trial was nevertheless continued, and his acquittal alone prevented serious trouble between the two governments.

CAROLINE, Amelia Elizabeth (1768-1821). Queen of George IV. of England. She was the second daughter of Charles William Ferdinand, Duke of Brunswick-Wolfenbüttel, and Princess Augusta of Britain, sister of George III. She was born on May 17, 1768, and on April 8, 1795, was married to the Prince of Wales, who, with no love for his cousin, consented to the union for the sake of liquidating his debts. She soon complained of his intimacy with Mrs. Fitzherbert and Lady Jersey. The King sought to reconcile the royal pair; but after the birth of their daughter, Princess Charlotte, January, 1796, the Prince of Wales deserted his wife. She received public sympathy and support, especially when official attempts were made to discredit her. In 1814 she obtained leave to travel, and lived in Italy for some time, but acted imprudently in showing favor to her courier, Bergami, and his family. When her husband became King in 1820, she was offered an annuity of £50,000 sterling to renounce the title of Queen and live abroad; but she refused, and made a triumphal entry into London, whereupon the Government instituted proceedings for divorce on a charge of adultery. Indiscreet conduct was proved; but the manner in which she had been used by her husband, and the splendid defense of Brougham, caused such a feeling in her favor that the Ministry abandoned the divorce bill, after it had passed the House of Lords. She assumed the rank of royalty, but was repulsed from Westminster Abbey when she insisted on her right to coronation with her husband, July 29, 1821. Nine days afterwards she died. In direct disregard of the King's desire, the funeral procession, on its way to Brunswick, where Caroline was buried, passed through the city of London; but not before lives had been lost in an encounter with the Life Guards at Hyde Park Corner. Consult: *Memoirs of Queen Caroline*, by Nightingale (London, 1820); Adolphus (London, 1821); Huish (London, 1821); Wilk (London, 1822); also Clerke, *Life of Her Majesty Queen Caroline* (London, 1821).

CAROLINE BOOKS (Lat. *Libri Carolini*). A work in four books, drawn up, probably in 790, by the authority of Charles the Great, against the decrees of the Iconoclastic Council of 754, and of the Second Council of Nicæa, in 787. The latter had been translated into Latin incorrectly, and the author of the Caroline Books supposed that they ordered the same worship to be paid to the images as to the Trinity. The Caroline Books reject both iconoclasm and the worship of images. The author is unknown. Consult Hefele, *History of the Councils*, Vol. III., Book 20, Chap. 2 (Freiburg, 1873-90).

CAROLINE ISLANDS. A group of small and widely scattered islands in the Pacific Ocean, extending from the equator to about latitude 10° N. and from about longitude 136° to about 164° E. (Map: Australasia, G 2). They number about 525, including reefs and uninhabited rocks, and their area is estimated at 560 square miles. They are mostly low and of coral formation, and their soil is not above the average in fertility. The main islands of the group are Rug, or Hogolu, Ponape, and Strong. The chief product is copra, while some of the islands also yield shells. The commerce is mostly in the hands of the German Jaluit Company, which has stations on almost every important island. Administratively the group is a part of the German New Guinea Protectorate. The population of the Caroline Islands is estimated at 36,000, and consists chiefly of Micronesians, with about 900 Europeans. Most of the natives have been converted to Christianity. They are well developed physically and mentally, a little shorter than the eastern Polynesians, and dolichocephalic. The ruins of stone structures on the islands of Ponape, Lalla, etc., are by some writers (e.g. Christian, in 1899) needlessly attributed to a 'black race,' predecessors of the present occupants. These 'famous' ruins are doubtless remains of the works of the forefathers of the people now inhabiting the archipelago, for elsewhere, as in Tonga, Easter Island, etc., the Polynesians have demonstrated their ability to surpass these achievements. The Carolines were discovered in 1525 by the Portuguese Diego da Rocha, and further explored during the Seventeenth Century by the Spanish admiral Francisco Lazeano, who gave to the group its present name in honor of King Charles II. In the beginning of the Eighteenth Century the group was entirely abandoned by Spain, and it was not until the beginning of the Nineteenth Century that the existence of the Caroline archipelago was again brought to the attention of the civilized world by a number of scientific expeditions. At length German commercial interests became paramount in the Carolines, and the hoisting of the German flag over Yap in 1885 called forth the protest of Spain. A settlement reached in the same year, with the Pope as an arbitrator, recognized Spain's claim to the archipelago, but conferred special privileges on Germany. In 1899 the Caroline, Pelew, and the Ladrone groups (except Guam), were ceded to Germany in consideration of the sum of 16,750,000 marks (about $3,300,000). Consult: Christian, *The Caroline Islands* (London, 1899); Otto Finsch, *Karolinen und Marianen* (Hamburg, 1900); id., *Anthropologische Ergebnisse einer Reise in der Südsee* (Berlin, 1883).

CAROLINE MATILDA (1751-75). Queen of Denmark and Norway. She was the youngest child of Frederick, Prince of Wales, and in 1766 married Christian VII., by whom she became the mother of Frederick VI. The King was a youth of feeble character, and by self-indulgence had reduced himself almost to a state of imbecility. From the first he treated the Queen with coldness. In the course of time she became involved in an amour with Struensee, the Court physician, who at the same time was a favorite with the King, and was appointed Cabinet Minister and created a count (1771). Early in 1772, as the result of a Court intrigue, the Queen and Struensee were arrested, each confessed guilt, and Struensee was executed. The royal marriage was declared dissolved, but when it was proposed to banish the Queen, the British Government interfered. She received a pension of £5000, was allowed to retain the title of Queen, and spent her last years in a castle at Celle, Hanover. Consult Wraxall, *Life and Times of Queen Caroline Matilda* (London, 1864) and Wittich, *Struensee* (Leipzig, 1899). See STRUENSEE.

CAR′OLIN′GIANS (Fr. *Carlovingiens*, Med. Lat. *Carolingi*, from OHG. *Karling*, descendant of Karl, particularly Charles Martel). The second dynasty of Frankish kings. The origin of the family is traced to Saint Arnulf, Bishop of Metz, who died in 641. His son, Ansegisel, married a daughter of Pepin (q.v.), of Landen, in Austrasia. Their son, Pepin of Heristal, the greatest territorial lord in Austrasia, was called to the office of Mayor of the Palace, in that kingdom. At the battle of Testry in 687, Pepin compelled the weak Merovingian King, Theuderich III., to invest him with the office of Mayor of the Palace in all the three Frankish States, Neustria, Austrasia, and Burgundy. Pepin allowed the Merovingian kings to remain upon the throne, but they were kings only in name. He died in 714, and left as his successor a grandson who was a mere child; but Charles Martel (q.v.), a natural son of Pepin, was made Mayor of the Palace by the Austrasians, and in this capacity brought the three States under his power. He died in 741. His two sons, Carloman and Pepin the Short, divided the kingdom, although for a time the nominal Merovingian dynasty still existed. Carloman abdicated after a few years and entered a monastery. Pepin at last formally assumed the royal power, and was crowned King of the Franks in 751. From this is dated the beginning of the Carolingian dynasty. Pepin was succeeded by his sons, Carloman and Charles the Great (q.v.) or Charlemagne, of whom the latter soon reigned alone, and prodigiously extended his dominions. In 800 Pope Leo. III. set upon his head the crown of the Western Roman Empire. He planned to divide his dominions among his sons, of whom, however, only one, Louis the Pious, survived him, who, in the list of the Kings of France, appears as Louis I., but who was properly Emperor and King of the Franks. With Charlemagne the high abilities of his family disappeared, and his successors were comparatively weak. Family feuds broke out during the life of Louis the Pious, who had divided his dominions among his sons, and he terminated his troubled reign in 840. By a treaty concluded at Verdun, in 843, Lothair I., the eldest son of Louis, obtained the imperial crown and the kingdom of Italy, with Lorraine, Franche Comté, Provence, and Lyonnais; Louis, his brother, called Louis the German, obtained the German part of his father's dominions; and Charles the Bald, the son of a second marriage, obtained Neustria, Aquitania, and the Spanish Mark. The Emperor Lothair I. died in 855, and his dominions were again divided—his eldest son, Louis II., becoming Emperor and King of Italy, and his two other sons kings of Lorraine and of Provence, the kingdoms of the two younger brothers later reverting to the Emperor. Charles II., the Fat (q.v.), son of Louis the German, reigned over the reunited realm of Charles the Great from about 884 to 887, when he was deposed. Arnulf (q.v.), King of Germany, obtained the imperial dignity later, and Louis III., the Child (q.v.) ruled in Germany from 899 to 911, when the Carolingian dynasty there became extinct. The French dynasty, of which Charles the Bald may be deemed the founder, continued a succession of weak monarchs and pretenders to the throne for about a century, till it terminated with the reign of Louis V., on whose death Hugh Capet, the most powerful nobleman in France, seized the crown, in 987. The Carolingian kings had for some time possessed little real power. A subsequent marriage connected their family with that of the Capets, and enabled the kings of the Capetian dynasty (q.v.) to trace their descent from Charlemagne. See FRANKS; FRANCE; GERMANY; HOLY ROMAN EMPIRE.

CAROLUS DURAN, kȧ′rō̂′lụs′ dụ′rän′. See DURAN, CHARLES AUGUSTE EMILE.

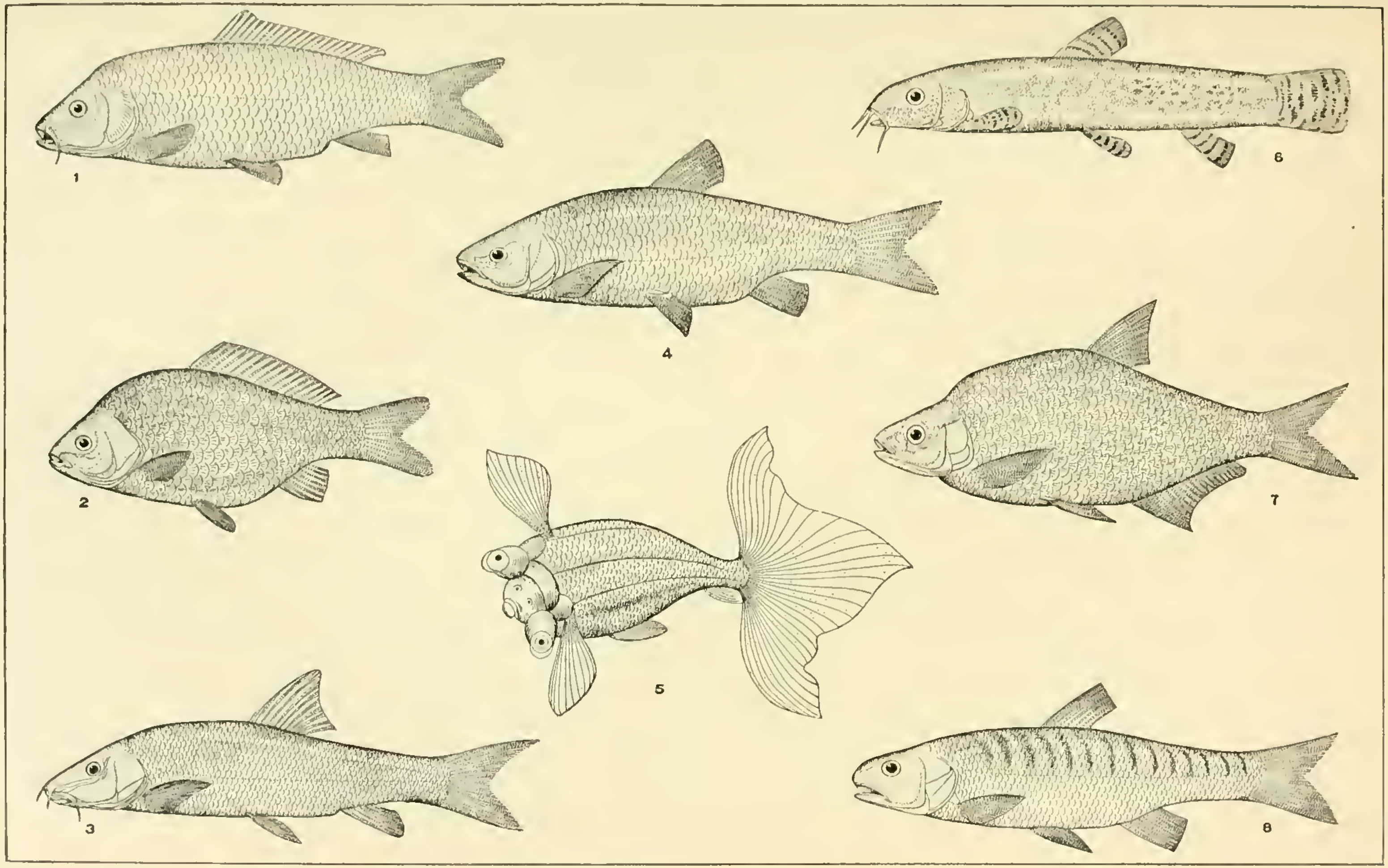
CARON, kȧ′rôɴ′, RENÉ EDOUARD (1800-76). A Canadian statesman and jurist. He was educated at the Seminary of Quebec and at the College of Saint Pierre, and was admitted to the bar in 1826. He was mayor of Quebec from 1827 to 1837 and Speaker of the Legislative Council of Lower Canada from 1843 to 1847, and again from 1848 to 1853. On being appointed judge of the Queen's Bench in the latter year, he abandoned politics. In 1857 he was commissioner for codifying the laws of Lower Canada, and in 1873 was appointed Lieutenant-Governor of Quebec.

CARORA, kȧ-rō′rȧ. A town in the State of Lara, Venezuela, about 40 miles east of Barquisimeto, and midway between that city and Lake Maracaibo. Stock-raising and tanneries are the chief industries, and there is a considerable trade in gums and rubber. The town was founded by Spaniards in 1572. Population, 8000.

CAROT′ID ARTERY (Fr. *carotide*, Lat. *carotis*, Gk. καρωτίς, *karōtis*, carotid, from κάρος, *karos*, deep sleep). The great artery which on each side distributes blood to the different parts of the head. Each carotid artery consists of the primitive or common carotid, which, at the upper margin of the larynx, separates into two great divisions of nearly equal size, the external and internal carotid. The external carotid supplies the larnyx, tongue, face, and scalp with blood, its principal branches being the superior thyroid, the lingual, the facial, the occipital, the posterior auricular, the internal maxillary, and the temporal. The internal carotid enters the cavity of the cranium through a somewhat tortuous canal in the temporal bone, and after perforating the dura mater, or fibrous membrane of the brain, separates into the anterior and middle cerebral arteries, which are the principal arteries of the brain; while in its course through the dura mater it gives off the ophthalmic artery, which subdivides into several small branches that supply the eye and surrounding parts. See CIRCULATION.

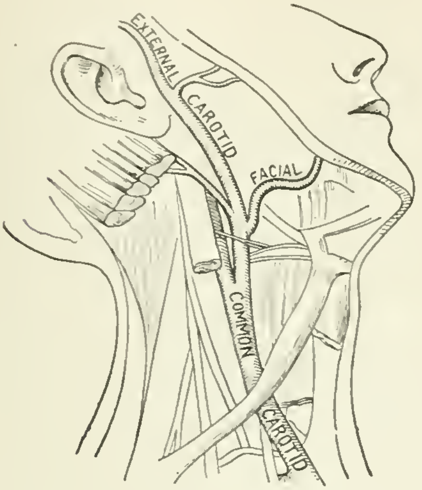
Wounds of the carotid trunks are generally from stabs. Suicides have a vague desire to cut them, but rarely cut sufficiently deep by the side of the windpipe. Of course, should either vessel be wounded, death would result almost immediately. Punctured wounds, however, may not be immediately fatal; they may heal, or a false aneurism (q.v.) may result. These arteries are sometimes the seat of spontaneous or true aneurism. Sir Astley Cooper was the first to tie the common carotid for spontaneous aneu-

CARPS AND THEIR EUROPEAN ALLIES



1. CARP (Cyprinus carpio).
2. CRUCIAN OR GERMAN CARP (Carassius vulgaris).
3. BARBEL (Barbus vulgaris).
4. CHUB OR SKELLY (Leuciscus cephalus).
5. GROTESQUE VARIETY OF GOLD FISH.
6. LOACH OR GROUNDLING (Nemacheilus barbatula).
7. COMMON OR YELLOW BREAM (Abramis brama).
8. MINNOW (Leuciscus phoxinus).

rism, in 1805, and since then the operation has been successfully performed many times. Owing to the numerous interchanges of branches between vessels of both sides of the head, cutting off the supply of blood through one carotid is seldom followed by impairment of brain structure or function. The common carotid in the horse is the termination of the right arteria innominata. It is a large vessel about an inch long, which emerges from the chest below the windpipe, and divides into the right and left carotids. These bend upward, having the windpipe between them gradually inclining inward at the upper part, where each divides into external and internal carotids, and a large anastomosing branch arising from between these two. Consult Toldt, *Anatomischer Atlas* (Berlin and Vienna, 1900).



CAROTID ARTERY.

CAR′OTIN (Lat. *carota*, carrot). A group name for the yellow pigments common in leaves. Carotin is probably identical with the so-called xanthophyll. The yellow pigments may be dissolved out from leaves by alcohol and partially separated from the green ones (chlorophyll) by shaking the solution with benzine. After standing a short time, most of the green, being more freely soluble in the benzine, floats on the alcohol, which contains most of the yellow. Crystals of carotin may also be formed in the leaf-cells by appropriate treatment. Similar slender orange crystals are found in the color-bodies (see CHROMOPLASTS) of the carrot, from which the pigment took its name, and in some fruits. According to Arnaud, carotin is a hydrocarbon having the composition $C_{26}H_{38}$. See ETIOLIN.

CAROTO, kȧ-rō′tō, GIAN FRANCESCO (1470-1546). An Italian painter, born in Verona. He studied under Mantegna, whom he surpassed in majesty and harmony. His later works, which are said to imitate the manner of Leonardo, are severe in outline, but warmly colored. Most of his works are found in Verona, where the best-known is his series of pictures on the "History of Tobias," in Sant' Eusemia.

CAROUGE, kȧ′rōōzh′. A town of Switzerland, situated about one mile south of Geneva, on the left bank of the Arve (Map: Switzerland, A 2). It is regularly built, is surrounded by villas, orchards, and meadows, and has a handsome church. There are manufactures of thread, clay pipes, leather, watches, and pottery, as well as of machinery and ironwork. A bridge across the Arve connects the town with Geneva. In 1780 the King of Sardinia, as ruler of Savoy, tried to make Carouge the industrial rival of Geneva, but failed. Population, in 1900, 7400.

CARP (Ger. *Karpfe*, OHG. *charpho*, Icel. *karfi*, Welsh *carp*, Russ. *karpŭ*, probably borrowed from the Germanic). A fresh-water fish (*Cyprinus carpio*), typical of the family Cyprinidæ (q.v.), now acclimated in all parts of the world. The body is robust, compressed, and covered with large scales; head naked; mouth rather small, toothless, with fleshy lips and four well-developed barbels. The dorsal fin is quite long, the anal much shorter. The color is a uniform dark brown above, growing quite light on the ventral side. The carp may attain a weight of 40 to 50 pounds, but the usual weight is much less than this. It thrives best in lakes and ponds, and in streams seeks the quiet, sluggish waters, where it feeds largely on vegetable matter, but will also eat insect-larvæ, worms, etc. The carp may reach an age of 200 years. It spawns about June; the eggs, which are small, transparent, and number several hundred thousand, are fastened to aquatic weeds, where they will endure great vicissitudes of weather and temperature. During the winter months it hibernates and does not take food. So exceedingly hardy is it, that it may be kept alive even for days in moist moss if properly fed, and consequently may be transported great distances with facility.

The original home of the carp was southeastern Asia, where it has been tamed and cultivated since the earliest times by the Chinese, and where it is still found wild. It was introduced into northern Europe several centuries ago, and transplanted about the Fourteenth Century to Great Britain, under the name of German carp. From Europe it has been brought casually to North America, and about 1870 a strong effort was made to plant it extensively in the still waters of the United States; this succeeded widely, but the extreme prolificacy of the fish, quickly overcrowding small ponds, and the comparative coarseness of its flesh, which is readily tainted by foul waters, have prevented it finding as great favor with the American public as in German Europe. There are three varieties of carp: (1) the scale-carp, which, excepting the head, is entirely covered with scales; (2) the mirror-carp (*Spiegelkarpfe* of the Germans), which has three to four rows of very large scales along the sides, the rest of the body remaining bare; (3) the leather-carp (*Lederkarpfe*), in which the scales are entirely wanting. All these are equally good as food, although a preference is often shown for the sealed variety. To the angler, the carp is not a very valuable fish, as he is by no means a free biter. Several other fishes are called carps, notably the European congener called Crucian (q.v.), and the closely allied goldfish; also some entirely different ones, as the sea-bream and the American carp-suckers. See Plate of CARPS AND EUROPEAN ALLIES.

CARP, PETRACHE (1837—). A Rumanian statesman. He was born at Jassy, studied at

Bonn, took part in the overthrow of Cuza, and, after Prince Charles had ascended the throne, entered the diplomatic service. With Blarenberg he founded an anti-liberal journal. In 1870 he became Minister of Foreign Affairs, and in 1892 of Commerce, Agriculture, and Domains. He was known for political discourses, and for his renderings of Shakespeare.

CARPACCIO, kär-pä'chō, VITTORE, called Scarpaccia by Vasari (c.1450-c.1522). An Italian painter, important as marking the transition in the Venetian school from the fifteenth century to the heights which it attained in the sixteenth. He was born probably at Capo d'Istria, but spent most of his life in Venice, where he may have been a pupil and was for a time the assistant of Gentile Bellini, like whom he took up the new method of painting in oil. In 1490 he painted the great series of nine pictures on the life of Saint Ursula (Academy, Venice), which are remarkable for their mastery of the conditions of historical painting, for beauty of imagination and of detail. Next in importance is the series painted between 1502 and 1508 for the Dalmatian hospice of San Giorgio degli Schiavoni, Venice — nine pictures on the lives of Saints George, Jerome, and Tryphonius. In 1510 he produced what may be called his masterpiece, the "Presentation in the Temple" (Academy, Venice). A third great series, on the life of Saint Stephen (1511-15), has been scattered in the Louvre, Berlin, Milan, and Stuttgart. Like Gentile Bellini, Carpaccio has a wonderful talent of narrative, enlivening the solemnity of his subjects with a certain lightness of treatment which never fails to make them interesting; and while his drawing is often faulty, and the faces of his figures are unpleasant, his work is attractive by reason of his color, which, with all its golden brightness, is clear and harmonious. Consult Molmenti, *Carpaccio, son temps et son œuvre* (Venice, 1893).

CARPA'THIAN MOUNTAINS. A mountain system of Central Europe, extending in the form of a broad arc along nearly the entire boundary of Hungary east of the Danube (Map: Hungary, H 2). The arc, opening to the southwest, embraces the plain of Hungary and the elevated basin of Transylvania (Siebenbürgen), separating the former from the Austrian provinces of Moravia, Silesia, Galicia, and Bukowina on the northwest, north, and northeast, and the latter from Rumania on the east and south. Both wings of the arc rest upon the Danube, the one terminating near Presburg, where it is in juxtaposition to the Leitha range of the Austrian Alps, the other ending at Orsova, where it confronts the northern extension of the Balkans. The length of the system, following the curve, is about 800 miles. The Carpathian system is composed of numerous mountain groups which exhibit a variety of orographic and geological features. On the northwest the main elevations are included in the Kleine Karpaten (Little Carpathians), the Weisses Gebirge (White Range), and the Neutra and Tátra ranges. These ranges, with the bordering ranges of the West Beskiden and the Hungarian Erzgebirge, converge in northern Hungary to form a mountain knot, near the centre of which are the Hohe Tátra Mountains, the loftiest in the entire system. Eastward and southward the Carpathians are continued in a broad curve by the Ost Beskiden and by the Waldgebirge into Transylvania, where the ranges widen out so as to surround on the east and west the basin of Transylvania, whose southern limit is the Transylvanian Alps.

The Carpathians include no summits that are comparable in elevation to the culminations of the Alps, but the mountains are frequently massive and imposing in appearance. The highest point of the system is the Gerlsdorferspitze of the Hohe Tátra Range, which is 8,737 feet. In the same range are the Lomnitzerspitze, 8642 feet; the Eisthalerspitze, 8630 feet; and the Schlagendorferspitze, and other peaks extending 8000 feet. In the eastern Carpathians there are many peaks from 5000 to over 7000 feet above the sea. The Transylvanian Alps, whose trend in the main is east and west, present an almost unbroken mountain barrier crowned by jagged summits that reach an extreme height of over 8000 feet, the loftiest peak, Negoi, being 8318 feet. In general, the higher elevations of the Carpathians are composed of granite and crystalline rocks, while the outlying lower ranges are formed by upturned and folded sedimentary strata. Mesozoic sandstone is the prevailing formation in the Beskiden, and granite, gneiss, and schist in the Transylvanian Alps. Eruptive igneous rocks are found along the whole system, but are most prominent in the Hungarian Erzgebirge and in the ranges of Transylvania. These regions are noted for their deposits of gold, silver, lead, copper, and other metallic ores, which have been worked for many centuries. The Carpathian system forms the water-parting between the drainage basins of the Oder, Vistula, and Dniester, and of the middle Danube. Small lakes frequently occur in the interior of the mountains, particularly in the Hohe Tátra, where more than 100 have been found. Some of them are at great elevations, and many are very deep. These lakes are called by the Hungarians 'Eyes of the Sea.' There are no glaciers nor perennial snow-fields. Numerous passes cross the system, facilitating communication between Hungary and the bordering countries. The Carpathians are clothed with extensive forests of oak, beech, chestnut, and fir, which harbor bears, wolves, and lynxes. See HUNGARY, and TRANSYLVANIA.

CAR'PATHOS. See SCARPANTO.

CARPEAUX, kär'pō', JEAN BAPTISTE (1827-75). A French sculptor, the pupil of Duret and Rude. His best-known works are: "The Fisher Boy," "Ugolino and His Children," "Neapolitan Fisherman," "France Enlightening the World and Protecting Agriculture and Science," the noted group, "La Danse" (1869), on the façade of the Paris Opera House, and "The Four Quarters of the World Sustaining the Sphere." Among his portrait busts are those of Gérôme and of Alexander Dumas, fils. Although the faults of the Naturalistic School are accentuated in his work, his robust imagination and technical skill give him a high place among latter-day sculptors.

CARPEL (Fr. *carpelle*, Neo-Lat. *carpellum*, from Gk. καρπός, *karpos*, fruit). One of the ovule-bearing elements of the pistil in flowering plants (angiosperms). The carpel is usually considered to be a modified single spore-bearing leaf (sporophyll). Several carpels are often organized together to form a single ovule-containing organ, which organ, whether consisting of one or many carpels, is called a pistil. See FLOWER.

CAR'PENTA'RIA, Gulf of. A broad and deep indentation of the north coast of Australia, with an average length and breadth of 350 miles, stretching from latitude 11° to 17° 30′ S., and from longitude 136° to 142° E. (Map: Australia, F 1). It was named after Carpenter, a Dutchman, who discovered and partly explored it in 1627. The gulf contains many islands. The shores are generally low with extensive indentations on the western coast.

CAR'PENTER (OF. *carpentier*, Med. Lat. *carpentarius*, from Lat. *carpentum*, cart, from Ir. *carbad*, *cairbh*, chariot, *carb*, basket), Navy. An officer of warrant rank in the United States and British navies who acts as assistant to the executive officer in keeping the hull, spars, boats, etc., of a man-of-war in good condition. In the days of wooden ships he was a skilled mechanic in wooden shipbuilding, but since the advent of iron and steel ships he has been required to have a thorough knowledge of metal-working and a practical knowledge of shipbuilding in iron and steel, as well as of wood-working. The carpenter of a ship of the navy is assisted by several artisans, called collectively the *carpenter's gang*, which includes shipwrights, plumbers, blacksmiths, painters, and carpenter's mates. When a carpenter has served ten years as such he is commissioned as a *chief carpenter*, with the rank of ensign. His pay and status are the same as those of the boatswain.

CARPENTER, Lant (1780-1840). An English Unitarian minister. He was born in Kidderminster, studied at the University of Glasgow, taught school from 1803 to 1805, and was employed in the Liverpool Athenæum. He then became pastor of a church in Exeter, and in 1817 removed to Bristol. At both places he conducted schools, having Harriet and James Martineau among his pupils in Bristol. He was much interested in the religious instruction of children, and established several Sunday-schools. He did much to broaden the spirit of English Unitarianism. He rejected the rite of baptism as a superstition and substituted a form of infant dedication. Among his works are: *Unitarianism, the Doctrine of the Gospel* (1809): *Systematic Education* (2 vols., 1815): *Examination of the Charges Made Against Unitarians* (1820): and *Principles of Education* (1820). Consult his *Memoirs*, edited by his son, R. L. Carpenter (London, 1842).

CARPENTER, Louis George (1861—). An American irrigation engineer, born in Orion, Mich. He graduated in 1879 at the Michigan Agricultural College, studied at Johns Hopkins University, and was appointed assistant professor of mathematics and engineering at the former institution. In 1888 he was appointed professor of engineering and physics at the Colorado Agricultural College. He was special agent of the United States artesian-wells investigation in 1890; founded the American Society of Irrigation Engineers in 1891, and in 1899 was appointed director of the agricultural experiment station at the Colorado Agricultural College. The first systematic instruction in engineering given in any American college was organized by him. His publications include various Government reports.

CARPENTER, Mary (1807-77). An English philanthropist, the eldest child of the Rev. Dr. Lant Carpenter (q.v.). She took an active part in the movement in behalf of orphaned or neglected children, and besides advocating their cause in her writings, founded several reformatories for girls, one of which, the Red Lodge Reformatory, she superintended. In the prosecution of her philanthropic labors, she visited India three times, and in 1871 organized the National Indian Association, whose journal she edited. Among her intimate friends were Harriet Martineau and Frances Power Cobbe, the latter being for some time associated with her at Red Lodge. She published: *Reformatory Schools* (1881); *Juvenile Delinquents* (1853); *Our Convicts* (2 vols., 1864), a book which drew public attention to the treatment of young criminals: and *Six Months in India* (2 vols., 1868). Consult J. E. Carpenter, *Life and Work of Mary Carpenter* (London, 1879).

CARPENTER, Matthew Hale (1824-81). An American lawyer and politician, born in Moretown, Vt. He spent two years in the United States Military Academy; studied law with Rufus Choate, and in 1848 settled in Wisconsin. He was remarkably successful as a lawyer, and was especially notable for his defense of W. W. Belknap, Secretary of War, when the latter was impeached before the House of Representatives, and for his argument in favor of Samuel J. Tilden before the Electoral Commission (q.v.). Carpenter was twice elected United States Senator from Wisconsin, serving from 1869 to 1875, and again from 1879 until his death. Consult Flower, *Life of Matthew Hale Carpenter* (Madison, Wis., 1883).

CARPENTER, Rolla Clinton (1852—). An American engineer. He was born at Orion, Mich., and was graduated from the University of Michigan in 1875. In 1878 he was appointed professor of mathematics and civil engineering in the Michigan Agricultural College, where he also had charge of the mechanical department from its organization until 1888. In 1890 he became associate professor of experimental engineering at Cornell University, also conducting the laboratory of the department of experimental mechanics and research, probably the best department of its kind hitherto established. He was president of the Michigan Engineering Society in 1889; chairman of the national committee for the education of engineers in 1891; and president of the American Society of Heating and Ventilating Engineers (1898). In addition to numerous scientific papers, he has published the following works: *Instructions for Mechanical Laboratory Practice;* and *Text-Book of Experimental Engineering* (1892).

CARPENTER, William Benjamin (1813-85). An English physiologist, born at Exeter. Soon after his graduation in Edinburgh, in 1839, he published his *Principles of General and Comparative Physiology*, afterwards divided into *The Principles of Comparative Physiology* and *The Principles of General Physiology*. These works, together with *The Principles of Human Physiology* (1846, and still a standard work, after going through many editions) and *The Principles of Mental Physiology* (1874), form a perfect cyclopædia of biological science. Carpenter likewise published: *A Manual of Physiology; The Microscope, Its Revelations and Its Uses* (6th ed., 1881): a prize essay upon *The Use and Abuse of Alcoholic Liquors* (1851); and numerous memoirs on various departments of physiology, microscopical anatomy, and natural history, in the *Philosophical Transactions.* His most important original researches are *On the Structure of Shells; On the Development of Purpura Lapillus;* and *On the Structure, Functions, and General History of the Foraminifera.* His published works also include: *Zoölogy and the Instincts of Animals* (1857); *Physiology of Temperance* (1870); *Mesmerism and Spiritualism* (1877); and *Nature and Man* (1888). For several years he edited *The British and Foreign Medico-Chirurgical Review,* and he was one of the editors of *The Natural History Review.* From 1856 to 1879 he was registrar of the University of London. He took a chief part in the Government expedition sent out in 1868-70 for deep-sea exploration in the northern Atlantic, and in consequence he contributed largely to the discussion of the vexed question of ocean circulation, in the *Journal* of the Royal Geographical Society and other periodicals. He advocated the doctrine of a *vertical circulation,* sustained by opposition of temperature only, independent of and distinct from the *horizontal* currents produced by winds. This doctrine was first advanced by Professor Lenz, of Saint Petersburg, in 1845; but Dr. Carpenter was ignorant of this when the deep-sea observations, begun in 1868, led him to an identical theory. He was president, in 1872, of the British Association for the Advancement of Science.

CARPENTER, William Boyd (1841—). An English clergyman of the Established Church, Bishop of Ripon. He was born in Liverpool, was educated at the Royal Institution, Liverpool, and Saint Catherine's College, Cambridge, and was appointed Hulsean lecturer at Cambridge in 1878. In 1887 he was appointed Bampton lecturer at Oxford, and in 1895 pastoral lecturer on theology at Cambridge. He held several curacies, was vicar of Christ Church, Lancaster Gate, from 1879 to 1884, canon of Windsor in 1882-84, and chaplain-in-ordinary to Queen Victoria in 1883 and 1884. In the latter year he was appointed Bishop of Ripon. His numerous publications include: a *Commentary on Revelation* (1879); *Permanent Elements of Religion* (Bampton lectures 1889); *Lectures on Preaching* (1895); and a *Popular History of the Church of England* (1900).

CARPENTER BEE. A solitary bee that excavates its nest in solid wood, in a dead twig, or in the pith-hollow of various plants; it represents in the United States various species of Ceratinidæ and Xylocopidæ. The former are smooth, active, fly-like little bees, usually metallic blue or green, of which the *Ceratina dupla,* one-quarter inch long, is a familiar example. It bores tunnels into the stems of pithy plants, and especially of brambles. This tunnel is divided into silk-lined compartments by partitions made of agglutinated pith. An egg, together with some pollen, is inclosed in each compartment until the entire burrow is filled save a small space at the entrance just large enough to contain the parent female, where she awaits the hatching of her children. The hatching occurs in each compartment in succession, beginning with the bottom, each bee tearing out the partition of its own cell and awaiting the birth of the bee above it. When all are ready the female sallies forth with her brood, and soon after arranges for a second. The large carpenter bees of the family Xylocopidæ are represented all over the northern United States by *Xylocopa virginica,* which is as large and noisy as a bumblebee, but reversely colored, and its hind legs bear tufts of hair instead of pollen-baskets. This bee bores its tunnels, which are nearly half an inch in calibre, in solid wood, such as that of dead timber, dry stumps, fence-posts, and unpainted woodwork about houses and outbuildings; it is therefore easy to observe the method in detail. A short perpendicular entrance made across the grain leads into the centre of a burrow following the grain, which may be 18 inches long, requiring a month's labor. The raspings formed in excavation are agglutinated, probably by salivary excretions, into partitions dividing the burrow into cells about two-thirds of an inch long, in which the eggs are placed together with balls of pollen and nectar. Several bees may use the same entrance to the tunnel and several chambers may run parallel, but usually they run in opposite directions from the common door. These bees will often utilize an old burrow to save the great labor of digging, and would do so more regularly, perhaps, did they not often find them already preëmpted by other kinds of insects. See Bee, and see Plate of Wild Bees.

CARPENTRAS, kär′päN′trä′ (ancient *Carpentoracte,* of Celtic origin). A town in the Department of Vaucluse, France, on the left bank of the Auzon, 16 miles by rail northeast of Avignon (Map: France, M 7). It contains a number of Roman remains, including a small triumphal arch. It has also an old cathedral, an episcopal palace (now used as a palais de justice), a theatre, and a library. The chief products are leather, wax, chemicals, and fruit. Population, in 1896, 8391.

CARPENTRY. See Building, and Wood-Working Machinery. The artistic side of carpentry is treated under Architecture.

CARPET (OF. *carpite,* It. *carpita,* a coarse cloth, Med. Lat. *carpeta, carpita,* from Lat. *carpere,* to pluck). A cloth or other woven fabric used to cover a floor. Woven carpets were first used in the East, where the custom of sitting cross-legged on the floor still renders them especially useful. Our early ancestors covered the floors of their houses with rushes, hair, or straw, and carpets, when first introduced, were used to cover tables. As late as 1736 a carpet is defined, in Bailey's *Dictionarium Britannicum,* as a table-cover; but in a succeeding edition, published in 1766, it is described as a covering for a table, passageway, or floor. At first the carpets used in Europe were all imported from the East, and the trade was largely in the hands of the Italian cities. Long before this, however, noble ladies, monks, and nuns in convents had been accustomed to make beautiful tapestries, which were occasionally used as floor-coverings. In 1607 a regular factory was established at the Louvre for making these wall-hangings and carpets, by the reigning King of France, Henry IV. In 1627 the carpet-factory known as the Savonnerie was established in Chaillot, and in 1664 Colbert, Minister of Louis XIV., established a carpet-factory at Beauvais. Most of the weavers in these factories were Protestants, of Flemish descent, and, with the revocation of the Edict of Nantes.

they established carpet-factories in those countries where as fugitives they settled. At this time (1685), and by this means, the English carpet industry began. In 1735 the manufacture of ingrain carpeting had become a flourishing industry in the town of Kidderminster, after which this style of carpeting is sometimes called Kidderminster. In 1831 Richard Whytock invented the process of making tapestry and velvet carpets which is described below. This was an important event in the history of the carpet industry, for it put upon the market a comparatively inexpensive pile carpet differing entirely in appearance from the Scotch ingrains.

The history of carpet manufacture in the United States begins with the rag-carpet industry, which continued to be of considerable importance until toward the close of the last century. Each village had its weavers, to whom the thrifty housewives brought their balls of rags, carefully sewed together and brilliantly dyed. So late as 1890 there were in the United States 854 rag-carpet weavers' shops, with an annual output valued at $1,714,480. The first factory for the manufacture of yarn carpets was built in Philadelphia in 1791. The Jacquard apparatus for weaving designs was introduced in 1829, and in 1841 Erastus Biglow perfected the first power loom for weaving carpets, which saved 33⅓ per cent. in the cost of labor. There were then about thirty carpet-factories in the United States, most of which made ingrain carpets. Ten years later Biglow devised a power loom for weaving Brussels carpets, and thereby greatly increased the extent of their manufacture. The United States is now the greatest producer and consumer of carpets in the world. Most of the wool used in the manufacture of American carpets is imported, as the home-grown product is of too fine a quality to be durable.

Excluding the Oriental rugs (see RUGS), the principal varieties of carpets in commerce are the Axminster, the Brussels, the Wilton, Moquette, Tapestry Brussels, Velvet, Ingrain, and Venetian.

The French Savonnerie carpets are woven at the same factory in Paris where the Gobelin tapestries are made. They have a velvet pile, and are made by hand in one piece, the looms being large enough for several workmen to work at one time. The surface is formed by knotting the woof and warp threads together in a complicated manner, and then shearing the surface. Aubusson carpets are made at the famous tapestry factories in Aubusson, and are a species of tapestry carpet. The centre design of an Aubusson carpet is usually a medallion. The Savonnerie and Aubusson carpets, being of fine material and hand-made, are among the most expensive of floor-coverings. The real Turkey carpet is made in one piece. The patterns consist merely of curved and angular strips, of variegated but dark and unobtrusive colors. The warp is of strong linen or cotton, to which bunches or tufts of colored worsted are tied according to the pattern, a drawing of which is placed before the weaver to copy. The colored worsteds are tied very rapidly by young girls. The Axminster carpet is merely the English-made Turkey carpet, first produced in Axminster, England, in 1755, by Thomas Whitty. They are usually made to order, of the size required for the room. From the tediousness of the process of manufacture and the large amount of wool required, they are very expensive. The Berlin carpets, made in Germany and in the United States, are similar to the hand-made Axminsters. In making chenille Axminsters, the chenille is first woven, cut into strips, and bound into thick tufts, which are held firmly together in a row by the binding thread. The chenille is then woven into a carpet, being used as the weft thread. Chenille Axminsters over 27 inches wide are woven on a hand loom. The machine Axminster is made like a moquette, described below, but is usually finer and of better quality.

The body Brussels carpet is a mixture of linen and worsted; but, like the Turkey carpet, the worsted only is shown on the upper surface. The basis or cloth is a coarse linen fabric, and between the upper and under threads of the filling several worsted threads of different colors are firmly bound in. The pattern is produced by drawing to the surface, between the reticulations of the cloth basis, a portion of the worsted thread of the color required at that spot to produce the pattern. These updrawn portions are formed into loops, by being turned over wires, which are afterwards withdrawn, and the loops thus left standing above the basis form the figured surface of the carpet.

The Wilton carpet is made like the Brussels, but the wire has a groove in its upper surface, and instead of being drawn out, it is liberated by passing a sharp knife through the worsted loop into this groove, and thus making a velvet pile surface instead of the looped thread. The loops are made longer than in Brussels carpeting, and it usually contains about 50 per cent. more wool. In the United States, the carpet called moquette is a machine-made imitation of a carpeting made by hand at Nimes, France. The machine moquette was first manufactured in 1856, on a loom invented by Halcyon Skinner. It is a pile carpet, but the pile is not formed with wires, but by cutting off little pieces of woolen thread and fastening them in tufts to the warp thread.

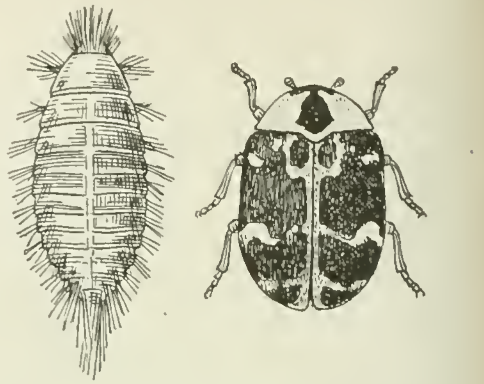
Carpets known as tapestry Brussels and velvet are very extensively used as a cheap substitute for Brussels and Wilton, which they are made to resemble very closely in the brilliancy and variety of pattern. The manufacture of this kind of carpet is curious and ingenious. Instead of several colored yarns, only one of which is drawn to the surface at any one place, while the others remain buried between the upper and under threads of the cloth basis, a single colored yarn is used, and the variety of color produced by dyeing it of various colors at intervals of its length. The yarn is coiled upon a drum, and printed by means of rollers in such a manner that when the threads that encompass the roller are uncoiled and laid in line side by side, they present an elongated printing of the pattern; so that a rose, for example, the outline of which should be nearly circular, will be an oval, with length equal to four times its breadth. When, however, the thread is looped over the wire, four inches of yarn being used for an inch of the carpet pattern, the elongation is exactly compensated, and the rose appears in its proper proportions. The machinery required for this is, of course, much simpler than that for the Brussels, only one yarn having to be looped, and that always in the same manner. Velvet carpeting differs from tapestry Brussels in that the pile, which is made longer, is cut, forming a surface like that of the Wilton carpet.

A still cheaper process for manufacturing tapestry carpets was patented by James Dunlap, of Philadelphia, in 1891. The carpet is woven undyed, or of one uniform basic color, and the pattern is stamped by a color-printing machine similar to that used in calico-printing. Engraved pattern rollers, a separate one for each color, print, as they revolve, their design on the plane surface of the carpet, which is revolving in an opposite direction, but in contact with the pattern roller, on a drum.

The ingrain or Kidderminster carpet is a fabric composed of two webs or plies of cloth of different colors, and has no pile. The carpet is usually reversible, the color which forms the pattern on one side forming the background on the other, and vice versa. This mixing of the two plies is called ingraining, and the more general and thorough the mixing of the colors of the design is, the more durable will be the fabric. In the plain ingrain only two colors are used, but in the 'shot-about' ply two or more shuttles of different colors are employed in each ply. The Venetian carpet, used chiefly for stairs and halls, is made of a worsted or cotton warp and jute filling. The pattern is all on the warp, which alone is visible, as it incloses the weft between its upper and under surfaces. Consult *The History and Manufacture of Floor-Coverings* (New York, 1899). See WEAVING.

CARPETBAGGERS. A term of contempt applied by the people of the Southern States to those who came from other parts of the Union to live in the South, or to transact business there, after the close of the Civil War; but applied particularly to those who came to make money by irregular and sometimes criminal means out of the corrupt governments (called carpetbag governments) of the Reconstruction Period. (See RECONSTRUCTION.) The term was originally used to designate the 'wildcat' bankers of the West, who defrauded the people and could never be found when wanted; and, by extension of meaning, is sometimes applied to those who drift about from place to place, and have no fixed residence.

CARPET BEETLE or BUG, or BUFFALO MOTH. An imported dermestid (*Anthrenus scrophulariæ*), whose destructive larvæ, first noticed in the United States at Buffalo, N. Y., about 1872, have become a widely scattered household pest. The adult beetle is about one-eighth inch long, and covered with scales of black, white, and red, with white spots on the prothorax and wing-covers; it is thus frequently confused with the much larger and harmless ladybird beetle, that also at times seeks refuge in houses during winter. It feeds on the pollen of flowers. The larvæ are short, fat, hairy grubs, and may be found under the edges of carpets, along seams, in floor-cracks, and particularly beneath heavy furniture. They feed on the carpet materials, on the lint that collects under matting and in cracks, and on woolen clothing and furs. Pyrethrum powder sprinkled in places frequented by them is helpful. The carpets of infested houses should not be tacked down, but placed so that they may be examined frequently. Pieces of woolen cloth on closet floors act as traps to attract and collect the larvæ. Infested clothing may be cleared by shutting it up in tight boxes and subjecting it to the fumes of carbon bisulphide. Clothing packed away in tight receptacles with a plentiful supply of naphtha balls is rarely disturbed by the beetles. Two other species of this same genus (*Anthrenus varius* and *Anthrenus museorum*) are great pests of insect, bird, and other museum collections. See *Insect Life*, II. (Washington, 1889), and Osborn, *Household Insects* (Department of Agriculture, Washington, 1896).



CARPET BEETLE—LARVA AND ADULT STATES.

CARPET MOTH, SNAKE, ETC. The word carpet is often adjectivally applied to animals in the sense of variegated. Thus a 'carpet moth' is one of the geometrids having varied and lively ornamentation; but a carpet-eating moth, as *Tinea tapetzella* (see CLOTHES-MOTH), may also be meant. In Australia, a scylloid shark (*Crossorhinus barbatus*) is called 'carpet shark,' and the big, harmless pythonoid snake (*Morelia variegata*), so common in the same country, is everywhere known as 'carpet snake.' An American instance is found in California, where the beautifully marked little edible clam (*Tapes staminea*) of the Pacific Coast is known as the 'carpet shell.'

CARPET-SWEEPER. A device for sweeping carpets, consisting of a revolving brush enclosed in a wooden dust-pan. Its obvious advantage, in addition to great ease of operation, is that it picks up and confines the dust as it is gathered. See BRUSHES AND BROOMS.

CARPI, kär′pē. A town in the Province of Modena, Italy, 11 miles by rail northwest of Modena (Map: Italy, E 3). It contains two cathedrals, a castle, a theological seminary, and a theatre. It is the seat of a bishop, and was once the capital of the Principality of Carpi. Population of town, in 1881, 5987; commune, 18,788; in 1901, 22,932.

CARPI, UGO DA (c.1455-1523). An Italian artist, born at Carpi. He was but an indifferent painter, and his only claim to our interest is his own assertion that he was the inventor of chiaroscuro, that is, the process of printing engravings from blocks of different shades, which was the origin of chromo-printing. He claims this discovery in a letter to the Venetian Senate asking for protection against imitators (1516). The evidence on this question makes it probable that all engraving is of German invention (see Engraving), and Carpi's plates, mostly after Raphael and Parmigiano, are dated several years later than those of Jost de Necker, of Augsburg. At any rate he gave the process the name of chiaroscuro, and improved it.

CARPINCHO, kär-pēn′chō. See Capybara.

CARPIO, kär′pē-ō, Bernardo del. See Bernardo del Carpio.

CARPIO, Manuel (1791-1860). A Mexican poet, physician and man of affairs, born at Cosamaloapán, an ancient province of Vera Cruz. He studied medicine and translated the *Aphorisms* of Hippocrates (Mexico, 1823). Then he entered politics, represented his country in the Legislature of Vera Cruz, and became Senator and Councilor of State, 1853. His *Poesias*, and collected poems, have gone through several editions: the best is that which appeared in Vera Cruz and Paris in 1883.

CARPIONI, kär′pē-ō′nē, Giulio (1611-74). An Italian painter, born in Venice. He was trained by Alessandro Varotari, painted an abundance of indifferent religious pictures, but was more successful in the treatment of allegories and of subjects derived from classical mythology. Of his works may be cited "Liriope Brings Her Son Narcissus to the Blind Seer Tiresias" (the Vienna Museum), and "Latona Transforms the Peasants into Frogs" (Dresden Gallery).

CARPOC′RATES, or **CAR′POCRAS** (Gk. Καρποκράτης, *Karpokratēs*, or Κάρποκρας, *Karpokras*). The founder of the Gnostic sect of Carpocratians. He flourished under Hadrian (c.130 A.D.) at Alexandria. According to him, the essence of true religion consisted in the union of the soul with the Monas or highest God, by means of contemplation, which elevated it above the superstitions of the popular faith, and liberated it from the necessity of submitting to the common laws of society. Only he is to be reckoned wise who attains to this. Among those who have done so are Jesus, Pythagoras, Plato, and Aristotle. The cosmogony of Carpocrates was of the usual Gnostic character, the central peculiarity of which was the belief that the worlds were created by angels. Carpocrates also held the doctrine of the transmigration of souls. His followers existed down to the Sixth Century. Whether or not they were guilty of the abominations ascribed to them cannot be positively known.

CAR′POLITH, or **CAR′POLITES** (Fr. *carpolithe*, from Gk. καρπός, *karpos*, fruit + λίθος, *lithos*, stone). A fossil fruit of which the exact botanical relation is unknown. All these fruits and seeds of uncertain affinities are grouped together in the genus Carpolites, which comprises a very heterogeneous assemblage of fossils that vary greatly in respect of form and size. Many species from the Carboniferous rocks, originally described as Carpolites, have been more recently recognized as the seeds of gymnosperms, and have been distinguished under new generic names, such as Cardiocarpum and Rhabdocarpum, which are the seeds of the fossil Cordaites. Others from the Carboniferous and Permian rocks, and known as Trigonocarpum, may be the seeds of conifers allied to the modern gingko. Those Carpolites of Tertiary age comprise seeds of all forms, such as achenes, winged fruits, capsules, etc., and they occur in abundance in the Tertiary rocks of some regions of North America and Europe, as at Florissant in Colorado and at Oeningen in Saxony.

CAR′POPHYTE (from Gk. καρπός, *karpos*, fruit + φυτόν, *phyton*, plant, from φύειν, *phyein*, to produce). An old term of classification, used still by some botanists. It includes all those thallophytes, whether algæ or fungi, that produce complex spore-cases (sporocarps). It would include, therefore, among the algæ, chiefly the stoneworts and the red algæ; and among the fungi, the ascomycetes and basidiomycetes.

CAR′POSPORE (Gk. καρπός, *karpos*, fruit + σπορά, *spora*, seed, from σπείρειν, *speirein*, to scatter). A form of reproductive cell, borne in the cystocarps (fruit-cases) of the red algæ. See Rhodophyceæ and Algæ.

CARP-SUCKER (on account of the superficial resemblance to a carp). A fresh-water catostomid fish of the genus Carpiodes, found in the interior of the United States. It is allied to the suckers and buffalo-fishes, of which the common *Carpiodes cyprinus*, called also quillback, spear-fish, skimback, etc., is a prominent example. All are of carp-like form and habits, plain olive-green above and silvery beneath, and from one to three feet in length, and have no great value as food or for sport.

CAR′PUS, Carpal Bones. See Hand-Foot; Skeleton.

CARQUINEZ, kär-kē′nēs, or **KARQUENAS**, kär-kē′nas. A strait in California forming a portion of the boundary line between Contra Costa and Salano counties, and connecting Suisun and San Pablo bays (Map: San Francisco). It is 7 miles in length and its width in some parts is nearly 2 miles. It is navigable for large vessels. Benicia is on the north and Martinez on the south shore. The drainage from the valleys of the Sacramento and the San Joaquin passes through the strait.

CARR, Eugene Asa (1830—). An American soldier, born in Erie County, N. Y. He graduated at West Point in 1850, entered the mounted rifles, and served against the Indians until 1861, when he received command of the Third Illinois Volunteer Cavalry. During the Civil War, he saw much service in the Southwest, and rose in rank until, at the close of the war in 1865, he was brevetted major-general for gallant services on the field. Subsequently he conducted successful operations on the frontier, and became colonel in the regular service in 1879, and brigadier-general in 1892, a rank which he held at the time of his retirement in 1893.

CARR, Joseph Bradford (1828-95). An American soldier, born in Albany, N. Y. He was appointed lieutenant-colonel of the Second New York Volunteers in April, 1861, at the outbreak of the Civil War, took part in the engagement at Big Bethel, served under McClellan throughout the Peninsular campaign, and on September 7, 1862, was promoted to be brigadier-general for gallantry at Malvern Hill. He subsequently participated in the battles of Fredericksburg and Chancellorsville, commanding a division during a part of the latter; was distinguished for gallantry at Gettysburg; commanded successively the Third Division of the Fourth Corps and the Fourth Division of the Second Corps, and for a time had charge of the defenses along the James River. In June, 1865, he was brevetted major-general of volunteers for "gallant and meritorious services during the war." After the war he became a manufacturer in Troy, N. Y., and took an active part in State politics, being the candidate of the Republican Party for several offices, and serving as Secretary of State from 1879 to 1885.

CARR, Joseph William Comyns (1849—). An English art critic and dramatist, born in London. He was one of the editors of the *Academy*, the *Saturday Review*, and the *Examiner*, and became editor-in-chief of the *Illustrated Magazine*. He did valuable work organizing exhibitions of pictures, and became a director of the New Gallery in Regent Street, where so many of Burne-Jones's paintings were first seen. As a dramatist he wrote *Far from the Madding Crowd* (1882), an adaptation of Thomas Hardy's novel; and *Called Back* (1884), with Hugh Conway. His works on art include *Drawings by the Old Masters* (1877); *Examples of Contemporary Art* (1878); *Essays on Art* (1883); *Papers on Art* (1884); *Modern Landscape.*

CARR, Lucien (1829—). An American archæologist, born in Lincoln County, Mo. From 1876 to 1894 he was assistant curator of the Peabody Museum of American Archæology in Cambridge, Mass. With Professor N. S. Shaler of the Lawrence Scientific School he wrote *Prehistoric Remains of Kentucky.* Among his independent publications are *The Mounds of the Mississippi*, and an historical volume on *Missouri.*

CARR, Robert, Viscount Rochester, Earl of Somerset (? -1645). The worthless favorite of James I. of England. He was a younger son of Sir Thomas Ker (Carr), of Ferniehurst, Scotland. In 1603 he followed the King to England in the capacity of page; but he was presently discharged, retiring for a short time to France. He soon returned to the Court, and in 1604, at a tilting-match, was thrown from his horse and broke his arm in presence of the King, who was attracted by his pleasing appearance. James had a strong predilection for youthful male beauty; and besides he was desirous of freeing himself from the control of the Council, so that he might in effect become his own minister. To accomplish this purpose an old unconstitutional instrument was employed. He substituted a favorite for his constitutional adviser. Carr was loaded with wealth and honors. In 1607 he was knighted. Two years later he received Raleigh's confiscated manor of Sherborne. He became Viscount Rochester in 1611, and Earl of Somerset in 1613. He was the sole medium of the royal favor and authority, although he was devoid of every statesmanlike quality, and had only his good looks and high animal spirits to commend him.

In the meantime he became enamored of Lady Frances Howard, wife of the Earl of Essex. Through the influence of the King and her relatives, the Earls of Suffolk and Northampton, heads of the powerful Howard family, Lady Frances succeeded in having her marriage with Essex annulled by a special commission; and soon thereafter, on December 26, 1613, she married the newly created Earl of Somerset. The latter's influence had already begun to wane before that of George Villiers, when, in 1615, the murder of Sir Thomas Overbury, who had died of poison in the Tower in 1613, came to light. Overbury had enjoyed the confidence of Carr, then Viscount Rochester, during the amorous intrigue with Lady Essex, who later, actuated by fear or dislike, determined to put him out of the way. The Earl and Countess of Somerset were tried for the murder, and both were condemned to death. The Countess pleaded guilty; but the complicity of Somerset in the crime has never been clearly established. Both received the royal pardon. Somerset lived in obscurity until his death in 1645. Consult: Ranke, *History of England, Principally in the Seventeenth Century,* Vol. I. (Oxford, 1875); Gardiner, *History of England,* Vol. II. (London and New York, 1889); the latter's article in *Dictionary of National Biography,* Vol. IX.; and Archbishop Abbot, *The Case of Impotency..........in that Remarkable Tryal An. 1613, Between Robert, Earl of Essex, and Lady Frances Howard* (London, 1715); Amos, *The Great Oyer of Poisoning* (London, 1846).

CARR, Sir Robert (? -1667). One of the English commissioners to New England, appointed by Charles II., in 1664, his associates being Nichols, Maverick, and Cartwright. Nichols and Carr captured New Amsterdam from the Dutch in 1664 and changed its name to New York. Carr then forced the Dutch and Swedes on the Delaware to capitulate, and afterwards went to Boston, but when he attempted to supersede the constituted authorities he met with stubborn opposition from the people of Massachusetts, who refused to acknowledge the jurisdiction of the commissioners. Maine, however, submitted and was governed separately from Massachusetts during 1666-68.

CARRACCI, kär-rä′chē, or **CARACCI.** A family of Bolognese painters, founders of the Bolognese School (q.v.). The chief representatives, Lodovico, Agostino, and Annibale, worked and taught together; their style is similar, and they may therefore be treated together. Lodovico, the eldest, was born in Bologna, April 21, 1555, the son of a butcher. He studied there under Prospero Fontana, the Mannerist, and in Florence under Passignano. In Florence he also became thoroughly acquainted with the works of Andrea del Sarto. He was influenced most of all by Correggio in Parma and by his pupil Parmiggianino, and in Venice he studied chiefly Veronese and Tintoretto. With this equipment he returned to Bologna and was admitted into the guild of painters on March 23, 1578. He had in the meanwhile formed the ideal of an art which should unite the excellences of the chief Italian schools, and associated with himself the two sons of his father's cousin, who were to help him carry it out.

Agostino, the elder of the two, was born in Bologna, November 3, 1560, the son of a tailor. He was intended for a goldsmith, but upon Lodovico's advice he studied painting under Fontana, and engraving under Domenico Tibaldi. His brother Annibale, born November 3, 1560, was to be a tailor, but was taken into Lodovico's house to learn painting. The latter sent both brothers to Parma and Venice to study. Annibale, in particular, was impressed by Correggio, and has left admirable copies, now in the Pinacoteca of Parma, of that master's frescoes in the Tribune of San Giovanni. In Venice he studied Titian and Veronese, while Agostino became a friend of Tintoretto, and occupied himself chiefly with engraving, as a pupil of Cornelius Cort (q.v.).

Upon their return to Bologna, in 1582, Lodovico, who had attained prominence, associated them with him in the decoration of Palazzo Fava. The subjects represented were "Scenes from the Æneid" and the "Voyage of the Argonauts"; and the frescoes, being first attempts, were of no great artistic merit. But the hostile criticism which they caused, especially by reason of their naturalism, caused the Carracci to found their famous academy. (See BOLOGNESE SCHOOL OF PAINTING.) They called it the "Accademia degli Incaminati" (i.e. of those on the right road), and endeavored to give their pupils a theoretical and practical knowledge of painting, instead of the mere manual dexterity of the Mannerists. Their means of instruction included living models, dissection of dead bodies, plaster casts, the antique, drawings and engravings of the great masters, lectures on perspective and color. This was, in fact, the first modern academy of art, and it soon became the most important in Italy. Its chief endeavor was to unite the excellences of all Italian schools of the great period. The idea was originally Lodovico's, but the scholarly Agostino gave the theoretical and antiquarian instruction. At this period the Carracci worked much together, and it is difficult to determine the part of each in the common result. Their styles of painting are very similar: good drawing, a certain generality of type, and color based upon a study of the Venetians, and especially of Correggio. In general, we can go no further than to say of this joint work that the design and composition are due to Agostino, but the execution to the other two. In 1589 they finished their second important work in common: the frieze of Palazzo Magnani, representing the "Story of Romulus." In their third joint commission, the decoration of Palazzo Sampieri, each painted the ceiling of a different room, Lodovico representing the "Battle of a Giant with Zeus"; Agostino, "Hercules and Atlas"; and Annibale, "Hercules Encouraged by Virtue." Thus we have a basis for the comparison of their individual styles. Lodovico's art is more virile and grander in form than that of the others; it contains more pathos, more violent action, reminding one somewhat of Michelangelo or Tintoretto. It has traces of mannerism, from which the others are free. His coloring is derived mostly from Correggio, and is inferior to that of his cousins. Agostino's was exact in drawing, harmonious in composition, and delicate in color. His work is the most refined of the three, and has greater intellectual content; for while his learning chastened his art, it did not interfere with it. Annibale was a more facile painter, and executed a far larger number of pieces. His imagination was more spontaneous, and his art more natural and naïve. His colors are fresh and bright, but not so harmonious as those of Agostino.

These differences may be studied even better in their separate works, in which the Gallery of Bologna is richest. The earliest examples show the influence of the masters who were their models, and Lodovico's are strongly tinged with mannerism. His "Sermon of John the Baptist" (1591), in the Gallery of Bologna, shows strong naturalistic tendencies, while the "Vision of Saint Hyacinth," now in the Louvre, is a charming combination of the influences composing Eclecticism. In like manner, Annibale's "Assumption of the Virgin" (Dresden) and his "Pieta" (Gallery of Parma) show the influence of Correggio, while his "Assumption," in the Gallery of Bologna, reminds one of Veronese. But his "Santa Conversazione" (q.v.), also in Bologna, is a perfect specimen of Eclecticism. Annibale executed a large number of small compositions of this description, charming in sentiment and execution. Among his larger canvases, the "Madonna Appearing to Saint Luke and Saint Catharine" (1592) and the "Resurrection," both in the Louvre, and his "Saint Roche Giving Alms" (Dresden), show his highest development in oil painting. His "Three Marys" in Castle Howard (Yorkshire) shows a wonderful pathos of grief.

Agostino was more occupied with engraving than with painting. In 1589 he engraved Tintoretto's "Crucifixion" in the Suola di San Rocco with such success that Tintoretto himself pronounced the engraving better than the original. Agostino was fond of living in Venice, where his poetic and scholarly gifts were much appreciated, and where his son was born. Upon his return to Bologna he devoted himself anew to painting. His celebrated "Last Communion of Saint Jerome," painted for the Church of San Michele in Bosco, now in the Pinacoteca of Bologna, dates from 1592. Though surpassed in some respects by Domenichino's picture of the same subject, which was modeled upon it, this composition is a masterpiece of careful drawing, delicate color, and truthfulness of expression. His "Adulteress Before Christ," painted somewhat later, is also excellent in color and in action, and has a fine architectural background.

Not the least among the achievements of the Carracci was the revival of the landscape (q.v.). They treated it not only as a background for figure-painting, as their predecessors had done, but as an independent subject, in which the figures were accessories, thus becoming the originators of the modern landscape, and the true predecessors of Gaspard Dughet and Claude Lorrain (q.v.). This was done by Agostino, and especially by Annibale, who excelled in this work. His landscapes may be found in the galleries of Paris, Saint Petersburg, Madrid, Florence, and especially in the Palazzo Doria-Pamfili, Rome.

In 1597 the Carracci were invited to undertake the most famous and extensive of their works, the decoration of the gallery of the Farnese Palace in Rome. After arranging the business details, Lodovico returned to Bologna, leaving the execution of the work to his cousins. Agostino, assisted by Monsignore Agucchi, determined the composition. The subject was mythological, and represented the "Power of Love" over the strong, the proud, the chaste—over the universe. The frescoes show the influence of the Roman School, especially of Raphael; the disposition of space is modeled upon Michelangelo's ceiling of the Sistine Chapel. They are admirable pieces of decoration, the ornamental portion being particularly good. Agostino executed the two principal pictures of the long walls, the "Triumph of Galatea" and the "Rape of Cephalus," his chief works in fresco-painting—both excellent compositions, rich and symmetrical in line, fresh and bright in color. Except a few subjects painted after his designs by his pupils, Annibale did the remaining frescoes, which occupied him until 1604. This is unquestionably his best fresco work: his bright and fanciful naturalism is everywhere present. Among the best of these are the admirable genre pieces "Juno with the Girdle of Graces Before Jupiter," "Diana and Endymion," "Venus and Anchises," and the "Triumph of Bacchus." Annibale also decorated the ceiling of an adjoining room with mythological subjects, but this work is not as good as that in the gallery.

Agostino was compelled by the jealousy or ill will of his brother to leave Rome, but he was provided for by the Farnesi in Parma, where Duke Ranuccio protected him. He several times portrayed the Duke, but his chief work there was the frescoes of the Palazzo del Giardino, four mythological love scenes. He lived to complete only three. The quarrel with his brother and his enforced withdrawal from Rome had destroyed his bright spirits. After an apoplectic stroke he withdrew to a Capuchin monastery, where he died, March 22, 1602. In his many-sided talent he resembles the greatest masters of the Renaissance. In addition to being a painter, he was a poet and scholar of high repute. As an engraver he stands in the very first rank of Italian artists. His work is similar to that of his master, Cornelius Cort, but shows more freedom and versatility. He excels in correctness of design and in beauty of execution, and his figures are very expressive. He executed about 278 plates in all, largely from his own designs, and after the great Italian masters.

After finishing the frescoes in the Farnese Palace, Annibale sunk into a deep melancholy and sickness, brought on, it is said, because of disappointment over the small sum of money which he received for that great work—500 crowns in all. His illness prevented him from executing the more remunerative commissions which were offered him, and after a brief journey to Naples, where the murderous local artists much annoyed him, he died, July 15, 1609. He was accorded the honor of burial in the Pantheon, near the resting-place of Raphael.

Meanwhile Lodovico remained head of the academy in Bologna, busily engaged in teaching and in executing a number of his most important works. In 1604 and 1605 he decorated, with his pupils, the large court of the monastery Santa Maria in Bosco, near Bologna, with frescoes from the lives of Saint Benedict and Saint Cecilia. The seven frescoes which he himself executed are admirable pieces of decoration, and although much defaced, they may be studied from the engravings of Giovannini (Bologna, 1696) or Zanotti (ib., 1776). For the Cathedral of Piacenza he painted, in 1608 and 1609, two large canvases representing the "Burial of Mary," which are now in the Galleria Farnese, Parma, and a series of fine frescoes: in the sanctuary, "Choruses of Angels" and a "Limbus," and in the arch over the tribune, "Angels Strewing Flowers," the latter work almost equaling Correggio in charm. Between 1609 and his death he executed other important canvases, among which is the "Conversion of Saint Paul," in the Munich Gallery. His last works were in the Cathedral of Bologna, and a slight mistake in his fresco of the "Annunciation," which he was not permitted to rectify, so troubled him that it brought on a fever, which resulted in his death on November 13, 1619. He was buried with great splendor, noblemen of the city bearing his body to the tomb, for he was greatly beloved as a modest, just, and unselfish man.

ANTONIO MARZIALE CARRACCI (1583-1618), painter, was a natural son of Agostino, upon whom the family placed great hopes, which were thwarted by his early death. He studied under his father and uncle, and his art resembles theirs. His chief works in fresco were in the Church of San Bartolomeo del Isola (Rome), but have been ruined by time and restoration. His chief canvas is "The Flood," now in the Louvre.

Consult: Bolognonini-Amorini, *Le vite di Lodovico, Agostino, Annibale ed altri dei Caracci* (Bologna, 1842), and the works cited for BOLOGNESE SCHOOL OF PAINTING, especially that of Janitscheck.

CARRAGEEN, kăr′rȧ-gēn (so called from Carragheen in Ireland), CARRAGEEN MOSS, SEA-MOSS, or IRISH MOSS. A seaweed, or rather several species of seaweed, used both medicinally and as an article of food. The use of these seaweeds appears to have been originally confined to the peasantry of the coasts of Ireland. They are, however, found on the rocky seashores of most parts of Europe, and of the eastern shores of North America, large quantities being gathered for market on the Massachusetts coast. The species which principally constitutes the carrageen of commerce is *Chondrus crispus*, of which the varieties are remarkably numerous. It is 2 to 12 inches long, branched by repeated forking, cartilaginous, flexible, reddish-brown. After being collected, carrageen is washed, bleached by exposure to the sun, dried, and packed for the market. The chief nutrients are carbohdyrates, though more or less nitrogenous material is also present, as well as small amounts of other nutrients. When treated for ten minutes with cold water, in the proportion of half an ounce of carrageen to three pints of water, and then boiled and strained, it yields, with or without spices, a very pleasant drink. With a larger proportion of carrageen, a thickish liquid or mucilage is obtained; and on boiling down this decoction, and cooling, a stiff jelly is procured. Milk may be employed, instead of water, in the preparation of the various decoctions; and with the stronger one, along with sugar and spices, when cooled in a mold, a kind of *blanc mange* is obtained. Gelatin is manufactured from seamoss. Other edible marine algæ are dulse, or dylisk (*Rhodymenia palmata*); sloke, or laver (*Porphyra laciniata*); tangle (*Laminaria digitata*), and many Japanese species.

CARRARA, kär-rä′rȧ. A city of north Italy, in the Province of Massa e Carrara, 3 miles from the little seaport of Avenza, which is 32 miles north of Pisa, in a valley surrounded by the marble hills to which it owes its celebrity (Map: Italy, E 3). From 400 quarries, 4500 workmen cut and ship more than $1,000,000 worth of marble yearly, and 600 quarries in the neighborhood help to swell the total. The finest and whitest Italian marble, of which the most valuable varieties are Polvaccio, Bettogli, and Crestola, is found in the valley of Torano, although in recent years the bluish marble of Bardiglio has come into favor. The Romans, whose tools are frequently discovered, called the stone *Marmor lunense*, from the city of Luni, whose ruins are north of Avenza. Many foreign as well as Italian sculptors have studied in Carrara to save the expense of transportation of marble in the rough. The United States is represented by a consular agent. Most of the buildings are of marble, and the churches of Sant' Andrea (Thirteenth Century) and of the Madonna delle Grazie have magnificent marble statues of Rossi, Garibaldi, and Mazzini. There is a museum containing numerous statues and Roman antiquities, and also an academy of sculpture instituted by Napoleon. Most of the marble is shipped via Avenza, which has a small harbor and near which is a Fourteenth Century castle of Castruccio Castracani, with bold round towers and pinnacles. Population (commune), 1901, 42,097.

CARRARA, kär-rä′rȧ, Francesco (1805-88). An Italian writer on criminal law, born in Lucca. He became an instructor in criminal law at the University of Pisa, was a deputy in 1865-70, and a Senator from 1876. He was a steadfast opponent of punishment by death. His most important work is *Programma del corso di diritto criminale* (13 vols., 1879-86). His other publications include *Opuscoli di diritto criminale* (7 vols., 1878-80), and *Lineamenti di pratica legislativa penale* (2d ed., 1882).

CARRATRACA (kär′rȧ-trä′kȧ) **SPRINGS.** A health resort of Prescott County, Ontario, Canada, on the Ottawa River, 40 miles east of Ottawa (Map: Ontario, H 2). It is much frequented for the beneficial alterative effects of its mineral springs.

CARRÉ, kȧ′rā′, Michel (1819-72). A French dramatist, born in Paris. In 1841 he published a volume of verse, *Folles rimes et poèmes*, which was followed by several dramas, including *La jeunesse de Luther* (with Odeon, 1843) and *Scaramouche et Pascariel* (1847). After 1849 he collaborated with Jules Barbier in the composition of numerous comedies, and librettos for vaudevilles and operas. Their joint productions include *Galathée* (1852); *Le pardon de Ploermel* (1859); *Faust et Marguerite* (1850); *La reine de Saba* (1862); and *Mignon* (1862). With others he wrote the librettos of *Van Dyck à Londres* (1848, with Narrey); *Lalla-Rouck* (1862, with Hippolyte Lucas); and *Le tourbillon* (1867, with Raimond Deslandes).

CARREL, kȧ′rĕl′, Nicolas Armand (1800-36). A French journalist and republican leader. He was born in Rouen, was educated in the military school of Saint Cyr, and served for some years in the army. He then went to Paris, where he became the secretary of Augustin Thierry. In 1830, in connection with Thiers and Mignet, he became editor of the *National*, the most spirited and able of the journals opposed to the Government of Charles X. His colleagues having entered the Government of Louis Philippe, he was left to conduct the *National* himself, which he did with a spirit and a freedom such as had not been witnessed in France for many years. His attacks on more than one occasion checked the arbitrary power the Government attempted to exercise, and gained for him the admiration and esteem of the popular party. Government persecutions followed his outspokenness, and heavy fines were laid upon him; but these were paid by public subscription, and each conviction only made his journal more popular. Carrel, however, dreaded a revolution as much as he hated despotism, and had no sympathy with many of those who looked up to him as a leader. He was mortally wounded in a duel with Emile de Girardin, who had made a violent attack on his personal character. His principal articles were republished by Littré, under the title *Œuvres politiques et littéraires* (5 vols., 1854-58).

CARREÑO, kär-rā′nyō, Teresa (1853—). A Venezuelan pianist, born in Caracas. She studied first under her father, who was an amateur musician, and in 1862 appeared at a concert in New York, where she attracted the attention of Gottschalk, who taught her his own compositions. Later she was a pupil of Mathias in Paris. She has played with great success in the chief cities of Europe and the United States. Carreño married and was divorced from Emile Sauret, the violinist, the baritone Tagliapietra, and Eugene d'Albert, the pianist. In 1902 she married the younger brother of her second husband. A woman of many talents, she has composed a string quartet, piano pieces of the salon order, and the Venezuelan national hymn; she has won admiration as a concert singer, and, while managing an opera company, successfully wielded the bâton during the absence of the conductor. The chief traits of her playing are brilliancy, dash, and masculine vigor, for which she gained the appellation of 'the Valkyr of the piano.' The softer qualities are not greatly in evidence, but her intellectual grasp and breadth of interpretation place her among the greatest living pianists of both sexes.

CARREÑO DE MIRANDA, dā mē-rän′dȧ, Juan (1614-85). A Spanish painter, born at Aviles, in Asturias. He studied in Madrid under Pedro de Las Cuevas and Bartolomé Roman, and became Court painter to Philip IV. and Charles II. He is praised for his design and his color, which is surpassed only by Murillo. He left many pictures, most of which are in the galleries and churches of Spain. With Francisco Rizi he painted the cupola of San Antonio de los Portugueses, and a celebrated "Magdalen" at the Convent de las Recogidas.

CARRER, kär′rĕr, Luigi (1801-50). An Italian poet. Abandoning the law for literature, he supported himself for a time as proof-reader and typesetter in a printing-office, but later became successively secretary of the Istituto Veneto, professor of belles-lettres in the Scuola Tecnica, and director of the Museo Correr. Ill health, aggravated by unfortunate domestic relations, resulted in his death at the age of 49. Carrer's literary zeal and activity bore fruit in many different fields. His prose writings include a study of the life and writings of Goldoni, and a valuable biography of Foscolo. He planned an ambitious *Biblioteca Classica* of the best Italian writers, to be complete in one hundred dainty volumes. Of these only twenty-seven were published, but they were praised for wise selection and the excellence of their introductions. Carrer's poems include ballads, hymns, idylls, odes, sonnets, epigrams, and tragedies. In forms of verse, he adhered to classic models, and was a close follower of Foscolo; in the choice of subjects, he approached more nearly to the romanticists. His most successful poems are in the form of odes and ballads. His most widely read work is *L'anello di sette gemme*, in which he tells in verse the history and daily life of Venice. A collection of his prose works, *Prose*, appeared in 1855, his *Odi politiche e sonetti* in 1868. For his biography, consult: Veludo (Venice, 1851); Venanzio (Venice, 1854); and Crespan (Venice, 1869).

CARRERA, kär-rā'rȧ, José Miguel de (1785-1821). A Chilean politician and revolutionist, the first President of Chile, born in Santiago de Chile. He served in Europe in the Spanish Army, rose to the rank of major, went to Chile upon the outbreak there of the revolutionary movement, and became a member of the junta formed on September 10, 1810. Dissatisfied with the methods of the first Congress, which had convened on July 4, 1811, he established a new government, and with the support of the army, himself usurped the Presidency. On December 2, 1811, he dissolved the Congress, and thenceforth ruled as a military dictator. In 1813 he was forcibly removed from authority by the Junta, which appointed Bernardo O'Higgins to succeed him. This change he bitterly resisted, and although he made pretense of coöperating with O'Higgins at the battle of Rancagua (October 1 and 2, 1814), he really rendered that officer no assistance. He then fled to Buenos Ayres, and thence to the United States. In 1816 he returned to Buenos Ayres, where he organized an outlaw band, and sought to arouse a revolution against the Government. He was finally captured, and was executed at Mendoza, September 5, 1821.

CARRERA, Rafael (1814-65). A Guatemalan revolutionist and politician. He was of Indian and negro descent and entirely without education. He first came into prominence in 1837, when he succeeded in placing himself at the head of a band of insurgents against Morazan and the Federalists. In 1838 he captured the city of Guatemala, and in 1839 again held it by force. In 1847 he was elected President of the Republic, and in 1851 was reëlected for life. He was supported by the landed proprietors and the Church party, and recalled the Jesuits, who had been excluded for nearly a century. He always opposed the federation of the Central American States, and was a thorough-going absolutist. In 1863 he made war on San Salvador, took the capital, and expelled the President.

CARRERA, Valentino (1834—). An Italian dramatist, born in Turin. Until his retirement from office in 1878, he was connected with the Italian customs department. His earliest notable success was the comedy *La quaderina di Nanni* (1870), an interesting depiction of life in Florence. The long list of his works includes further *Galateo nuovissimo* (1875); *Bastoni fra le ruote* (1884); and *La filosofia di Giannina* (1885). A collective edition appeared in Turin in 1887-90 (4 vols.).

CARRIACOU, kär'rȧ-ȧ-kōō'. One of the British West Indies, belonging to the Grenadine group of the Windward Islands (q.v.) (Map: West Indies, R 8). It lies nearly 20 miles northeast of the island of Grenada, and is 7 miles long by about 3 miles wide. Population, about 3000. Cotton is the chief product.

CARRIAGE (OF. *cariage*, from *carier*, to carry, from Lat. *carrus*, car, from Ir. *carr*, car). A wheeled vehicle of any kind. The word is commonly used in a more restricted sense to apply to vehicles for carrying persons as distinguished from those for carrying freight; in this article, however, the term is used in its broader sense. Probably the first instrument employed for drawing burdens was the *sledge*. In Egypt, where we have the earliest recorded development of the arts, we find sledges pictured upon the monuments. For the conveyance of enormous loads, such as the blocks required for the Egyptian monuments, rollers must also have been used. Possibly it was the combination of the sledge and roller which formed the first rude carriage. The next step in the evolution of the carriage would be the substitution of wheels connected by an axle for the rollers extending all the way across the box or platform. As the rollers were simply hewn tree-trunks, so the first wheels were thin slices cut transversely from these trunks and connected by another of much smaller diameter. These primitive wheels revolved with their axles, like the wheels of railway trucks. The next step in advance was to mount the two wheels so that they revolved on their axle, while the latter either remained fixed, or moved from side to side only, in a horizontal plane. Another marked improvement was the substitution of wheels with spokes for the clumsy solid wheels.

The use of vehicles drawn by animals was probably introduced very soon after the domestication of the horse and ox. (See Cart.) How rapidly the various improvements in the construction of these vehicles were made is uncertain; but they must have been completed at a very early period in the history of civilization. In the writings of Homer and in the early books of the Bible, the terms naves, felloes, tires, and spokes are used. Covers are said to have been introduced by the Etruscans. Homer tells us that Hera's car was suspended by cords, so as to decrease the jolting. In the later Roman carriages the seat was sometimes placed on long poles, midway between the wheels, to lessen the jar, on much the same plan as the modern buckboard. During the Middle Ages vehicles were slung upon leather straps for the same purpose. Steel springs were not introduced until about 1700, and the elliptic spring was invented in 1804.

The simplest and earliest form of wheeled vehicle was the cart, or two-wheeled carriage. To its axle a pole was secured when it was destined to be drawn by two animals, or a pair of shafts when it was to be drawn by one animal. The chariots of ancient times, however elaborately ornamented, were of this simple construction. These chariots were used for war, for state purposes, for races, and for hunting; they were rarely used simply as a means of conveyance. War chariots were often armed with scythes, and on their sides were cases to hold the bow, sheafs of arrows, and other weapons of war. The bodies of chariots were small, usually holding but two persons. They were open for entrance at the back and had no seats. At first the wheels were very low, from 3 to 4 feet in diameter. As the chariot was adopted by different nations its primitive form was greatly changed. The wheels were enlarged, it was made to hold many persons, and finally four wheels were used. Little remained of the original chariot but its name.

The chariot used by the Britons at the time of the Roman Conquest possessed certain characteristics which commended it to the conquerors. It was on higher wheels than the Roman chariot, and was entered at the front instead of the back. The pole, instead of sloping upward to the horses' necks, went horizontally out between their bodies and was so broad that the driver could stand on it, and, if necessary, drive his horses from its outer end. But the most striking peculiarity of this chariot was that it possessed a seat. Cicero wrote to a friend in Britain that there appeared very little worth bringing away from Britain except the chariots, of which he wished his friend to bring him away one as a pattern. This form of chariot, called by the Romans the *essedum*, from having a seat, became very popular in Rome, and a diminutive form of the vehicle, with still larger wheels, was adopted for the conveyance of dispatches over the public roads. This carriage, called the *cisium*, resembled the modern gig.

In the National Museum in Washington is an interesting series of models showing the development of wheeled vehicles from the simplest and most primitive forms. Among these models is a reproduction of an Egyptian chariot, based on a wheel and forked brace, which were found at Dashur by H. Abbot, and are now in the museum of the Historical Society of New York. The wheel has six spokes with slots near the hub, through which to run a rope to secure the spokes more firmly. The felloe is in six pieces with scarfed joints. The tire of wood, also with scarfed joints, is attached to the felloe with a lacing of thongs. Near the reproduction of this ancient vehicle stands a miniature child's coach, or *bashkir*, used in Russia, which is probably the oldest surviving type of vehicle still in use. The wheels are of solid wood, through the centre of which holes are pierced by burning. In these holes is inserted a forked stick, which serves both as tongue or pole and axle. The covered body of the vehicle is made from the bark of trees sewn together. Another example, showing how the development of the arts repeats itself among different peoples, is given in the two full-sized carts on exhibition in the museum. The first of these is a caretta or ox-cart which is used by the Pueblo and other tribes of Indians of Arizona and New Mexico, as well as in parts of Spain, from which country it was introduced into America. The wheels, which are 3 feet 7 inches in diameter, are solidly built up of three pieces of thick timber, held together by dowels of wood. At the centre of the wheel the wood is left thicker to form the hub. The wheels revolve on an axle 7 feet 11 inches long, to which a tongue 8 feet 11 inches long is attached. A tall frame is constructed of light bows. No seat is provided. The second example of primitive wagon construction is the Red River cart, which is built and used by the half-breeds of British North America. These carts are constructed entirely of wood, including the axles and tires. Each consists of a light frame, poised on an axle connecting two strong wheels. These wheels are 5 feet 3 inches in diameter, and consist of 12 spokes and 6 felloes. The native driver sits on the bottom plank of the cart, and as the bed of the vehicle is lower than the shafts, his heels are higher than his hips. Over the top of this cart the native straps a hide and makes of it a tent. Underneath it he straps the same hide and converts his vehicle into a boat by means of which he crosses streams. Huge trains of these carts are used for carrying produce over the northern plains, as they are the chief means of land transportation.

Four-wheeled carriages for the conveyance of heavy loads were used by the civilized nations of antiquity, but they are probably of more recent origin than the two-wheeled vehicles. Herodotus tells us that the Scythians used a four-wheeled vehicle, consisting of a rough platform on which was placed a covering like a beehive, composed of basket work and skins. This cover they removed from the wagon and used for a tent. The Romans had many varieties of four-wheeled vehicles. The earliest forms seem to have been used for agricultural purposes, for carrying loads of general merchandise, and for the conveyance of images and vestal virgins in religious processions. Sir William Gell, in his work on Pompeii, describes a wine-cart, which is a four-wheeled wagon with an arch in the centre for the front wheels to turn under. During the later days of the Roman Empire chariots were mounted upon four wheels, and were so luxuriously equipped, even when owned by private citizens, that sumptuary laws were promulgated limiting the extent of their decorations. It must be remembered, however, that among the civilized nations of ancient times, as among modern Oriental nations, litters were used for the conveyance of persons from place to place. These litters were supported by poles, and were borne either by mules (*basternæ*) or by men (*lecticæ*). Their popularity undoubtedly retarded the development of pleasure carriages.

During the Dark Ages carriages fell into disuse. The old Roman roads, which had made their use possible, were ruined either wilfully or by neglect, and riding upon the backs of horses and mules was the only alternative for those who did not go on foot. Even goods were conveyed chiefly in huge panniers hung on the sides of strong draught animals. Gradually the use of carriages was revived, at first by royalty and the nobility, and later by the families of wealthy citizens. One of the earliest of these vehicles was the *whirlicote*, or cot upon wheels. King Richard II. and his mother rode in a whirlicote in 1380, when she was ill. The *caretta* was another vehicle often mentioned in mediæval literature. It seems to have been simply a highly ornamented two-wheeled cart, the descendant of the ancient chariot. During the Fifteenth Century these were very popular on the Continent, and in Germany an edict was issued forbidding their use, "because the useful discipline and skill in riding has been almost lost." About the commencement of the Sixteenth Century the art of coach-making assumed great importance in Continental Europe. (See COACH.) It was in the construction of coaches, to enable them to turn in a shorter space, that the custom arose of making the front wheels smaller than the hind wheels. With their introduction, also, began the use of leather springs. Carriages were not introduced into England until long after they had become popular on the Continent. State coaches were first built in England during the reign of Elizabeth, and about the same time long wagons for transporting goods, called *caravans*, began to be used. Their introduction was at first vigorously opposed by the sedan chairmen and by the boatmen on the Thames. The general use of carriages dates from the Eighteenth Century, but their greatest development did not occur in England until the Nineteenth Century. In the early part of that century, as a result of the work of Telford and Macadam, the highways of Great Britain were put into a condition which made vehicular traffic easy and pleasant. About this time (in 1804) Obadiah Elliott, a coach-maker of Lambeth, patented a device by which vehicles were hung upon elliptical springs, thus doing away with the heavy perch, or longitudinal wood or iron pole, which had always been used to connect the front and hind wheels of four-wheeled carriages. So important was this invention considered, that Elliott was awarded a gold medal by the Society of Arts. With this invention modern methods of carriage construction began.

Modern carriages are manufactured in great variety of form and mode of structure. The simplest form is the buckboard, in which the only spring is the long, flexible board which is attached directly to the hind axle and separated from the front one by a king-bolt. There are many forms of light four-wheeled carriages, usually drawn by one horse, which are classed under the general name of buggies, and which may or may not have folding tops. As an example of the latter class the runabout is a light and popular type. The surrey is a two-seated buggy. Then there is a large group of more elaborate hooded carriages, in which the driver's seat may or may not be on a level with the rest of the carriage, and in which there is often much glass used. These vehicles reach their greatest elaboration in the barouche and the brougham. There is a group of two-wheeled pleasure vehicles, in which the shafts are more or less rigid, as part of the load is borne by the horse. These are described under Cart.

Fashion and utility produce frequent changes and developments in carriages, and to the many forms different names are applied in different countries and at different times. Shooting-traps, golf-carts, mail-phaetons, and spiders are instances of vehicles which in many cases are used for purposes widely different from those for which they were originally designed. Victoria and cabriolet are the names of open-hooded carriages with two seats, while the vis-à-vis, an open carriage often fitted with a canopy, has seats for four people in addition to the coachman and groom. The landau is a large carriage for four passengers, where the top may be folded back, thus transforming it from a closed to an open carriage. Somewhat resembling the brougham, but higher, lighter, and somewhat less pretentious and costly, thus making it particularly available for use in the country and smaller towns, is the rockaway. Of similar construction, but lacking the more solid frame and glass of this vehicle, is the depot-wagon. The wagonette, which may or may not have a roof, consists of a box-seat for the coachman or driver in front of two longitudinal and parallel seats. The brake, which is well suited for four-in-hand driving, is a high vehicle with two, three, or four parallel and transverse seats, serving as a substitute for the road coach or drag. (See Coach and Coaching.) The brougham or coupé with little transformation becomes the 'four-wheeler,' which, especially before the introduction of the hansom, in America, was known as a cab, while the French *fiacre* and the German and Russian *droschke* may be considered a modified form of the victoria or cabriolet. The chaise, which is a term usually applied to a two-wheeled cart, now practically obsolete, was at one time extensively used, and in the United States was known as a shay, the word being preserved in the familiar poem by Holmes, entitled "The One-Horse Shay."

Of the vehicles used for the convenience of the general public, the cab, the stage-coach, and the omnibus are the principal types. The cab, or hansom cab, is a two-wheeled vehicle with the driver's seat behind and above the body of the carriage. It was invented in 1835 by an Englishman named Joseph Hansom. The development of the stage-coach is described under Coach. The omnibus is arranged with the entrance for passengers at the back, an aisle running lengthwise with a row of seats on each side facing each other. The omnibus came into use in England about 1829. The introduction of the steam railway and the street railway has perhaps decreased the use of omnibuses more than any other class of vehicles, though for many years they have formed an interesting feature of Paris and London street travel. The name and essential features, however, are preserved in a class of private carriage constructed on a smaller scale, and carrying more passengers than the usual three-seated vehicle.

The most notable feature in the construction of carriages at the beginning of the Twentieth Century is the increased use of rubber tires for both city and country vehicles. The pneumatic tire, first used about 1890, did not meet with universal use, being confined to trotting sulkies, runabouts, or heavy omnibuses. Later solid rubber tires were improved and made adaptable for all kinds of pleasure vehicles and are now found universally. The 'good-roads' movement in the United States has caused a quite general adoption of broader tires, especially for wagons to carry heavy loads. The different forms of horseless carriages are discussed under Automobile. For further information, consult: W. Burgess, *Practical Treatise on Coach-Building* (London, 1881); G. A. Thrupp, *History of the Art of Coach-Building* (London, 1877). See Cart; Coach; Coaching; Driving; Hansom; Phaeton; Wagonette.

CARRIAGE, Gun. See Ordnance.

CARRICAL, kȧ′rē′kȧl′. See Karikal.

CARRICKFERGUS, kăr′rĭk-fẽr′gŭs (Ir., Rock of Fergus, named after *Fergus* MacErch). A seaport town of Ireland, on Belfast Lough, 10 miles north-northeast of Belfast (Map: Ireland, F 2). Though within the county of Antrim, it forms of itself the county of the town of Carrickfergus, about 25 square miles in extent. Carrickfergus extends nearly a mile along the northwestern shore of the lough. The fishery of the bay, which is famous for oysters of an unusual size, employs a large number of the inhabitants. Salt of superior quality and in great abundance is mined. There are spinning-mills, bleaching establishments, and manufactures of linen and cotton fabrics. Its chief feature is the picturesque castle, erected by De Courcy in the Twelfth Century, on a rock about 30 feet high, projecting boldly into the sea, by which it is surrounded on three sides. The ballium or keep is 90 feet in height. From the summit a splendid view is obtained, extending, in a clear atmosphere, to the Mourne Mountains and the Scotch coast. The castle contains a barrack, bomb-proof magazine, ordnance storerooms, and cannon of large calibre command the entrance of the lough. A considerable portion of the town wall, completed in 1608, is still standing, as well as one of the four entrance gates. On June 14, 1690, King William III. landed here with his army. The rock on which the King stepped in landing is at the end of the quay, projecting from it, and still forms the landing-place. In 1760 Commodore Thurot captured the castle, but, on the approach of troops from Belfast, was forced to abandon it. Paul Jones, in 1778, captured the *Drake* war-sloop in the bay, but left the town unmolested. The parish church, founded in 1164, on the site of a pagan temple, is a fine old building, dedicated to Saint Nicholas. There is a literary and scientific society, with reading-room, library, and museum. There are several barrows or tumuli in the vicinity. Population, about 9000, about one-half of it belonging to the urban district. Consult S. MacSkimin, *History and Antiquities of Carrickfergus* (Belfast, 1811).

CARRICK-ON-SUIR, kār′rik-ŏn-shōōr′. A town in the county of Tipperary, Ireland, 12 miles east of Clonmel, in the midst of fine scenery (Map: Ireland, D 4). There is considerable woolen manufacture, and also linen and flax factories. It exports much agricultural produce. In the vicinity are good slate-quarries. Carrick-on-Suir became a place of note soon after the Norman Conquest. There are remains of a castle built in 1309.

CAR′RICK'S FORD. A ford over the Cheat River, in Tucker County, W. Va. Here, on July 13, 1861, a small Confederate force, retreating from Laurel Hill, was defeated by the vanguard of McClellan's army, under Gen. T. A. Morris. Among the killed was the Confederate leader, Gen. R. B. Garnett.

CARRIER, COMMON. A carrier is a person who carries on the business of transporting goods or passengers, by land or water. A *common* carrier is one who performs that service only for hire and for all persons indifferently. The term is applicable to teamsters, truckmen, and the like, as well as to railroad and steamboat companies, and the owners and masters of vessels of all kinds engaged in the business of transportation. It does not, however, ordinarily include proprietors of shops who deliver goods to purchasers, nor hotel-keepers who maintain conveyances for the purpose of transporting their guests to and from their hotels. In consequence of the peculiar character of the common carrier's occupation, the opportunities which it affords for dishonest dealing with another's property, and its importance to the community, the common carrier of goods has been subjected by the common law to two stringent obligations. In the first place, his service is compulsory; i.e. he is compelled to carry for all who may apply to him, without discrimination; and, in the second place, he is liable for loss or injury to the goods intrusted to him irrespective of any negligence on his part.

It is commonly, though inaccurately, stated that common carriers are responsible for any loss or damage during transportation from whatever cause "except the act of God or of the public enemy." By the weight of authority, the act of God means only such inevitable accidents as occur without the intervention of any human agency, although the decisions do not wholly agree in defining the phrase. The term public enemy embraces any *de facto* or *de jure* Government engaged in an act of war or public hostility against the Government of the common carrier. Pirates are also public enemies, but the term does not include robbers, bandits, rioters, or rebels against established governmental authority. In addition to these exemptions, the common carrier is not responsible for losses occurring by reason of acts done by public authority or the default of the shipper, or such as are due to the nature and character or inherent defects of the goods shipped, as, for example, losses by fermentation, evaporation, the ordinary decay of perishable articles, or the natural wear in the course of transportation, provided the carrier exercises reasonable care to make such dangers or the losses resulting therefrom as small as practicable. Railway companies, steamboat-owners, and other carriers who allow express companies to carry parcels and packages on their cars, boats, or other vehicles, are liable as common carriers to the owners of the goods for loss or damage without regard to the contract between them and such express carriers. Railways, steamers, etc., carrying passengers, although not liable for injury to passengers without the carriers' fault, are responsible for the baggage of such passengers intrusted to them as common carriers, and the responsibility continues until the delivery of the baggage to the owner, or to his order. See BAGGAGE.

The extraordinary common-law liability of a carrier may now generally be qualified by special contract or acceptance, assented to by the shipper. The carrier cannot, however, generally exempt himself from liability for negligence, though the English and some American courts hold to a different rule. The special contract is usually, though not necessarily, contained in the bill of lading, baggage-check, or passenger-ticket. The carrier's common-law liability has also been modified by statute in some jurisdictions, and on February 4, 1887, the Congress of the United States passed the "Interstate Commerce Act" (q.v.), which created the Interstate Commerce Commission and also provided for the regulation of commerce between the States carried on by carriers by rail or water.

Carriers who undertake general business are bound to accept all freight that is offered, under liability of legal action if they refuse without just excuse; but any carrier may restrict his business to certain goods, in which case he is not bound to accept other classes of goods for carriage. A carrier may require payment of freight in advance, and is entitled to a lien for his freight and for sums which he advances to other carriers in payment of freight. The responsibility of the carrier, as such, begins upon the delivery of the goods for immediate transportation. A delivery at the usual place of receiving freight, or to those employed by the company in the usual course of business, is sufficient. But where carriers have a warehouse at which they receive goods that are not to be forwarded until further order or a later time, they are in the meantime responsible only as warehousemen (see

WAREHOUSEMAN), and where goods are received by persons as wharfingers, or warehousers, or forwarders, and not as carriers, liability is incurred by them only for ordinary negligence. The responsibility of the carrier terminates in most jurisdictions when, after the arrival of the goods at their destination, a reasonable time has elapsed for the consignee to receive them in business hours. This rule, however, is subject to modification in several jurisdictions. Thus, in the State of Massachusetts the carrier's liability terminates as soon as the goods are stored by the carrier in good safety, while in the State of New York his liability does not terminate until a reasonable time after notice of arrival is given to the consignee, or reasonable efforts have been made to give such notice. After that the carrier may store them, and is responsible only for ordinary care. Generally speaking, the agents of corporations which are common carriers, such as railway and steamboat companies, bind their principals to the full extent of the business intrusted to their control, whether they follow their instructions or not; nor will it excuse the company to show that the agents acted willfully in disregard of instructions. The carrier has an insurable interest in the goods both in regard to fire and marine disaster, except such as results from the act of God or the public enemy. He is bound only to carry and deliver goods with reasonable dispatch, but, if a particular time is agreed upon for the delivery of goods, damages incurred through exceeding that time may be recovered.

Carriers of Passengers are not held responsible as insurers of the safety of their passengers. It is commonly said that they are held to the highest degree of watchfulness and care in the conduct of their business. By this it is not intended that the carrier of passengers should exercise all the care and diligence of which the human mind can conceive, but rather a care and diligence commensurate with the extraordinary duty of care for life and limb which he assumes as carrier, or that he should exercise the highest degree of care which a prudent man engaged in that business would exercise. An unexplained accident to the conveyance of the carrier, resulting in injury to the passenger, is *prima facie* evidence of negligence on the part of the carrier or his servants and throws upon the carrier the burden of showing that he has exercised the care required by law. Passenger-carriers are not responsible for injuries caused by the contributory negligence of the passenger, but this rule does not apply when the passenger's negligent act was induced by any just sense of peril caused by the improper or negligent conduct of the carrier.

Carriers of passengers are absolutely responsible for the baggage of passengers intrusted to them, as carriers of goods; and they are bound to exercise due care with reference to packages carried by the passenger into the conveyance of the carrier. Carriers of passengers are bound to receive passengers and to make every reasonable effort to carry them the whole route for which they stipulate, and according to the public notices and general customs of their business, but they are not bound to carry persons disorderly in conduct or those having contagious diseases, or those who are otherwise offensive or dangerous to their fellow passengers. The passenger must comply with all reasonable rules or regulations of the carrier with regard to purchasing, showing, and giving up tickets, and in respect to trains, use of cars, etc. Upon his failing to do this the carrier may refuse to accept him as a passenger or eject him from his conveyance. It is under this rule that the carrier is enabled to exclude merchandise and articles known as 'express matter' from its passenger-cars.

The carrier is bound to carry the passenger to his destination with reasonable dispatch, and at a reasonable time according to the published schedule, and is liable to pay damages for his failure to do so. The passenger ticket, like the bill of lading, is both a receipt and a contract, and unless limited by the terms it is freely assignable. As in the case of the carrier of goods, the carrier of passengers may regulate or limit his liability as carrier by notice or stipulation printed on the ticket and actually or constructively assented to by the passenger. As in the case of carriers of goods also, it is the general rule that the carrier cannot thus exempt himself from liability for his own negligence or that of his servants.

Carriers of passengers by water are generally subject to strict statutory provisions regulating the number of passengers, the amount of provisions, the navigating of the ship, pilotage, etc.

BIBLIOGRAPHY. Consult the authorities referred to under CONTRACT; BAILMENT; TORT; NEGLIGENCE, etc. Also Hutchinson, *Treatise on the law of Carriers*, 2d ed. (Chicago, 1891); Schouler, *Bailments and Carriers;* Ray, *Negligence of Imposed Duties, Carriers of Freight* (Rochester, 1895); id., *Negligence of Imposed Duties, Carriers of Passengers* (Rochester, 1892); Carver, *Treatise on the Law Relating to the Carriage of Goods by Sea* (3d ed., London, 1900); Fetter, *The Law of Carriers of Passengers* (Saint Paul, 1897).

CARRIER, kä'ryā', JEAN BAPTISTE (1756-94). A member of the French National Convention, born at the village of Yolet, in Upper Auvergne. He was procurator of the precinct of Aurillac when the Revolution began. In 1792 he represented Cantal in the Convention, where he soon became one of the most violent agitators. He took part, with Hébert, in the overthrow of the Girondist party, October, 1793, and immediately after was dispatched to Nantes and the Army of the West to assist in suppressing the uprising of La Vendée. Here he became practically an autocrat, although he at first acted in the name of a local committee which he himself selected. His acts were so fiendish as to awaken the horror of the most cruel of the Revolutionists. *Fusillades* and *noyades* (shooting and drowning parties) were his especial delight. Long lines of prisoners were ranged in front of open pits which they had been compelled to dig for their own graves, and were shot down so that their bodies fell by their own weight into the trenches. The hulks of vessels were filled with prisoners and scuttled. Men and women were tied together, hands and feet, and thrown into the Loire. This was called 'republican marriage.' It is said that during a single month 16,000 were shot or drowned at his orders. Robespierre finally recalled him, and after the death of Robespierre Carrier was called to account and vigorously defended himself before the Convention, contending that all his diabolical acts had been necessary under the circumstances, and had been done under orders. He was, however, condemned and guillotined, December 16, 1794.

CARRIER, Joseph Auguste (1800-75). A French artist, born in Paris. He studied under Saint, the miniature painter, and exhibited frequently at the Salon. Among his best portraits in miniature are those of Baron Lagarde and the Bishop of Poitiers (1834). He afterwards painted landscapes, with less success.

CARRIER, or Homing Pigeon. See Pigeon.

CARRIERA, kä-ryā′rȧ, Rosalba (1675-1757). An Italian painter, born in Venice. She began while very young to design lace, and then applied herself to the decoration of snuff-boxes under Jean Stève in Venice. He taught her miniature-painting, by which and by her portraits in crayon, once compared with those of Correggio, she is principally known. In 1720, already famous, she visited Paris and painted portraits of the King Louis XV. and the nobles and ladies of his Court. She was elected a member of the Academy, and presented as her 'picture of reception' a "Muse Crowned with Laurel." While in Paris she kept a diary (published by the Abbé Vianelli in 1793), which gives a most entertaining account of her visit there. She returned to Venice in 1721, visited Modena and Vienna, and was everywhere received with much enthusiasm. Toward the end of her life she became blind through overwork. There are one hundred and forty-three of her drawings in the gallery in Dresden, and the Louvre, Uffizi, and Saint Petersburg galleries own others. Consult the new ed. (French) of her diary, with life and notes (Paris, 1865).

CARRIER-BELLEUSE, kȧ′ryȧ′ be-lēz′, Albert Ernest (1824-87). A French sculptor, born at Anizy-le-Château, Aisne. Compelled from early youth to earn his living, he studied but intermittently at the Ecole des Beaux-Arts, and was hardly known until his return from England in 1855. In 1861 he received a third-class medal, and in 1866 a first-class medal for his statue "Angelica." His beautiful busts in terra-cotta best represent his art. He also executed many striking busts of Napoleon III., Jules Simon, Renan, and others in bronze and marble. Toward the end of his life he became director of the works at Sèvres, to which he gave new energy. Among the statues of this artist should be mentioned "Phébé endormie" (1869), at the Luxembourg, a monument to the memory of Masséna at Nice (1868), some carvings in the Louvre, and a chimney-piece and two candelabra in the foyer of the Opera House in Paris.

CARRIÈRE, kär′yâr′, Eugène Anatole (1849—). A French painter, born in Gournay, Seine et Marne. He studied at the Ecole des Beaux-Arts, and under Cabanal, but his subjects and his treatment of them are quite individual. He chooses the humble side of life, and invests it with a kind of melancholy grace. At its best this is seen in "La Jeune Mère," in the Museum of Avignon, and in "La Maternité," in the Luxembourg. He also painted some decorations in the Hotel de Ville, Paris, and in the Sorbonne.

CARRIERE, Moritz (1817-95). A German philosopher and writer on æsthetics. He was professor at Giessen, and later at Munich, and the author of many works on philosophy, religion, æsthetics, and poetry. He was an art critic of high rank. In philosophy he started as a Hegelian, but later followed more nearly the system of Fichte. His chief works are: *Aesthetik* (2d ed. 1873); *Die Kunst im Zusammenhang der Kulturentwicklung und die Ideale der Menschheit* (5 vols., 3d ed. 1876-86); and *Die sittliche Weltordnung* (1877). His '*Gesammelte Werke*, 13 vols., appeared in Leipzig in 1886-91.

CAR′RINGTON, Henry Beebee (1824—). An American soldier and military historian, born in Wallingford, Conn. He graduated at Yale in 1845, and afterwards studied at the Yale Law School and practiced law in Columbus, Ohio. In 1857, while on the staff of Governor Chase, he helped to organize the State militia; and at the outbreak of the Civil War he was made colonel ot the Eighteenth United States Infantry, and soon afterwards brigadier-general of volunteers. After the close of the war he served in the West till 1869, and in 1870 was made professor of military science in Wabash College, Indiana. In 1890 he took a census of the Six Nations and the Cherokees. His principal writings are: *Battles of the Revolution* (1876), regarded as the best military history of the Revolutionary War; *Russia as a Nation* (1849); *The Washington Obelisk and its Voices* (1887); *Washington, the Soldier;* and *Lafayette and American Independence.*

CARRINGTON, Richard Christopher (1826-75). An English astronomer, born in Chelsea. He was educated at Trinity College, Cambridge, and from 1849 to 1852 held the post of observer at the University of Durham. From 1852 he conducted valuable private investigations at an observatory erected by himself near Reigate (Surrey). He was secretary of the Royal Astronomical Society in 1857-62, and was elected to a fellowship in the Royal Society in 1860. His chief contributions to science were included in his *Catalogue of 3735 Circumpolar Stars* (1857), and *Observations of the Spots on the Sun* (1853). The effect of the latter work upon the study of solar physics was very decided.

CARRION-CROW. Any of various large black or dark-colored birds which feed on carrion; in the United States, and southward, the black vulture (*Catharista atrata*), a close relative of the turkey-buzzard. It is considerably larger than a crow, the plumage is blackish, and the head is bare, but most of the neck is feathered. It is found abundantly along the Gulf coast and northward to North Carolina, and is especially common in the cities and large towns, where it is protected as an indispensable scavenger, and often, as notably about the market in Charleston, becomes half domesticated. The nest is made on the ground under logs or bushes; the eggs are one to three in number, bluish-white, more or less spotted with brown. In England the 'carrion-crow' is a true crow (*Corvus corone*). It is the most like the American crow of any of the five British species, but is a little larger; seldom appears in flocks, but is more of a solitary bird; and not only eats carrion, but even attacks weak animals, such as young lambs, and often eats the eggs and young of other birds.

CARRION-FLOWER. See Smilax.

CARRION-HAWK. The birds so frequently referred to by this name in Darwin's *A Naturalist's Voyage* (London, 2d ed., 1877) are caracaras, especially the carancho (*Polyborus tharus*). See Caracara.

CARRIZO, kä-rē′thô (Sp., from Amer. Indian). The collective Spanish name for a group of tribes formerly occupying both sides of the lower Rio Grande, in Texas, and Tamaulipas, Mexico. They built houses thatched with reeds (carrizo), whence the name. They have been practically exterminated by the raiding tribes of Texas, among whom are still many Carrizo captives. Some years ago Gatschet found in the neighborhood of Camargo a few families still speaking their language, which, with others of the adjacent portion of Texas, constitutes a distinct stock, the Coahuiltecan.

CARROLL, Charles, of Carrollton (1737-1832). An American patriot. He was born in Annapolis, Md., but at an early age went abroad and was educated in the Jesuit colleges of Saint-Omer, Rheims, and Louis le Grand. He then studied law in Bourges, Paris, and London, and returned to America in 1764. He inherited the largest of the old manorial estates of Maryland, and was considered the wealthiest private citizen in the thirteen Colonies. In 1775 he was chosen a member of the 'Committee of Observation' at Annapolis, and in the same year was sent to the provincial convention. In 1776 he was one of the commissioners sent to persuade the Canadians to join in the war against England. Returning to Maryland, he became prominent as an advocate of union and independence, and in July, 1776, was sent to Congress, where on August 2 he signed the Declaration, writing 'of Carrollton' after his name, so that there could be no doubt concerning his identity, 'Carrollton' being the name of the family mansion. In Congress he was a member of the Board of War. In 1776 he was one of the committee that drafted the Maryland Constitution, and was chosen to the State Senate. In 1777 he was again sent to Congress, and in subsequent years was repeatedly elected to the State Legislature. In 1789 he was United States Senator, and in 1799 was a member of the Maryland and Virginia boundary commission. His last public act was the laying of the corner-stone of the Baltimore and Ohio Railroad, July 4, 1828. He died in Baltimore on November 14, 1832, aged 95, the last survivor of the fifty-six signers of the Declaration of Independence. Consult his *Life*, by J. H. B. Latrobe (Philadelphia, 1824). Consult, also, Mayer (editor), *Journal of Charles Carroll of Carollton During His Visit to Canada in 1776, as One of the Commissioners from Congress* (Baltimore, 1845); and Rowland, *Life of Charles Carroll of Carrollton* (2 vols., New York, 1898).

CARROLL, Henry King (1848—). An American clergyman, born in Dennisville, N. J. He was religious and political editor of *The Independent* (1876-98), and in 1890 had charge of the religious census of the United States. In 1898-99 he served as a special United States commissioner to Porto Rico, and since then he has been assistant secretary in the Methodist Episcopal Church Missionary Society. Besides Government reports and numerous reviews, he has published *The Religious Forces of the United States* (2d ed., 1896).

CARROLL, John (1735-1815). An American prelate, the first Roman Catholic bishop in the United States. He was born in Maryland, and was the cousin of the celebrated Charles Carroll of Carrollton (q.v.). He was educated in the Jesuit College of St. Omer's, Belgium, and was professor at St. Omer's College and Liège, from 1859 to 1871. He then joined the Jesuits and was prefect of the Jesuit College of Bruges. When the Order of Jesus was suppressed on the Continent in 1774, he returned to America. Two years later he was chosen by Congress, with his cousin, Dr. Franklin, and Samuel Chase, to urge the people of Canada to join the Colonies in the war against England. In 1784, on the recommendation of Franklin, Dr. Carroll was appointed by the Pope Superior of the Catholic Clergy in the United States. In 1789 he was appointed bishop, and in 1808 his see was made the Archdiocese of Baltimore. He founded Georgetown College in 1791. His writings were mostly controversial. Consult Shea, *Life and Times of the Most Rev. John Carroll* (New York, 1888)—being Vol. II. of his *History of the Catholic Church in the United States.*

CARROLL, Lewis. See Dodgson, C. L.

CAR′ROLLTON. A town and county-seat of Carroll County, Ga., 52 miles west by south of Atlanta, on the Little Tallapoosa River, and on a branch of the Central of Georgia Railroad (Map: Georgia, A 2). It is the principal town in an agricultural county producing chiefly cotton, corn, and fruits, and has an annual cotton trade of 23,000 to 25,000 bales. The industrial establishments include cotton, cotton-seed oil, rolling and planing mills, and a guano-factory. Population, in 1890, 1451; in 1900, 1998.

CARROLLTON. A city and county-seat of Greene County, Ill., 58 miles north of Saint Louis, Mo., on the Chicago and Alton and other railroads (Map: Illinois, B 4). It contains a fine court-house and city school, and a public library. The city is the commercial centre for the fertile region adjacent, and has a flouring-mill and a vegetable cannery. There are municipal water-works, the supply being pumped directly from a spring which has a steady and abundant flow. Carrollton was settled in 1819, and was surveyed two years later. Population, in 1890, 2258; in 1900, 2355.

CARROLLTON. A city and county-seat of Carroll County, Mo., 66 miles east by north of Kansas City, on the Wabash, the Chicago, Burlington and Kansas City, and the Atchison, Topeka and Santa Fé railroads (Map: Missouri, C 2). It is in a fertile agricultural region, of which it is the commercial centre, and has flour and woolen mills, wagon and harness factories, cigar-factories, foundry and machine shops, a furniture-factory, farm-machinery factory, tile-works, etc. Carrollton was settled in 1837 and incorporated twelve years later. Population, in 1890, 3878; in 1900, 3854.

CARROLLTON. A village and county-seat of Carroll County, Ohio, 41 miles northwest of Wheeling, W. Va., on the Wheeling and Lake Erie Railroad (Map: Ohio, H 4). Deposits of coal and clay are found in the adjacent region, which is largely agricultural. The principal manufacturing industry is a granite paving-brick plant. Population, in 1890, 1228; in 1900, 1271.

CAR′RON. A village in Stirlingshire, Scotland, on the right bank of the Carron Water, about one mile from Falkirk (Map: Scotland, E 4). It is celebrated for its iron-works, which were established in 1760, and are among the largest of the kind in Britain. The town gives its name to the obsolete *carronade*, a short cannon formerly used in naval service. Population, 1500.

CARRONADE (from the Scotch village *Carron*). A short, light gun of relatively large bore, which was carried by men-of-war about the beginning of the Nineteenth Century. The size of the shot used made them useful in close engagements, but they had slight range and little penetrative power. See ORDNANCE; GUNS, NAVAL.

CARRON OIL. A mixture of equal parts of limewater and linseed oil, employed as a dressing for burns. Its name is derived from that of the iron-works in England at which its reputation was made. Its efficiency is due to the sedative effects of alkalies, together with the sheathing of oily substances which prevents access of air. Carron oil is a soapy, thick, and inelegant mixture. The same results which follow its use may be obtained from the use of a solution of bicarbonate of soda and a thin smearing of vaseline. Many better dressings have about superseded carron oil. See BURNS AND SCALDS.

CARROT (Fr. *carot[t]e*, Lat. *carota*, probably from Gk. καρωτόν, *karōton*, carrot), *Daucus*. A genus of plants of the natural order Umbelliferæ. They are mostly natives of Europe. The common carrot (*Daucus carota*) is a biennial plant. The wild form is a bad weed. It has a slender, woody root of a very strong flavor. The improvement of the species is thought to have begun in Holland. It was introduced into England at the beginning of the Sixteenth Century, and is now in general, though not extensive, cultivation as a stock food and for culinary purposes. The roots have a yellow, white, or reddish color. The culinary sorts are generally small, mature early, and vary as much in form as do radishes. The stock carrots have a long, tapering root, and generally mature late, making their best growth during the cool weather of fall. For illustration, see TANSY plate.

Carrots for the table may be sown as soon as the weather is settled in the spring, in rows 1 to 2 feet apart, and the plants thinned to 2 to 3 inches in the row. A rich, sandy loam soil is best. The early crop requires about the same cultivation as do radishes. At maturity the roots are bunched and marketed like radishes. Carrots for stock are planted in the field in April or May, in rows 18 inches to 2 feet apart, and the plants thinned to 3 to 4 inches. They are cultivated, harvested, and stored like stock beets. For illustration, see DICOTYLEDONS.

Feeding and Food Value.—Carrots contain, on an average, in addition to 88.6 per cent. of water, 1.1 per cent. of protein, 7.6 per cent. of nitrogen-free extract, 1.3 per cent. carbohydrate, and a little fat and ash. They are relished by horses, and serve well for other stock, especially dairy cows; but are not very commonly fed to any great extent in this country. Like most roots, they are a very succulent feed. Carrots are often grown as a vegetable, and are served, boiled, with or without a cream or other sauce, or seasoned in a variety of ways. As ordinarily prepared for the table, the refuse (skin, etc.) constitutes about 20 per cent. of the whole root. When carrots are boiled in water, there is usually a considerable loss of nutritive material, consisting of sugar and other substances extracted by the water. If the whole carrots are cooked quickly, or cut in large pieces, the loss is less than is otherwise the case. Carrots contain a golden-yellow coloring matter which is used to some extent as a butter-color (q.v.).

CARROUSEL, kȧ′rōō′sĕl′ (Fr., a tilting-match, from It. *carosello*, tournament, for *garosello*, from *garoso*, quarrelsome, *gara*, strife, from *guerra*, war, OHG. *wera*; connected by popular etymology with It. *carriccllo*, little car, diminutive of *carro*, car). Originally, a species of knightly exercise, which, even down to the beginning of the Eighteenth Century, was very common at all the courts of Europe. A carrousel was a kind of imitation of the tournament, and for a time after the discontinuance of the latter seems to have supplied its place. The dresses, for the most part, were those of the knights of former times, and the combatants (or, rather, competitors) were divided into two parties, usually according to their different nationalities. One of the favorite exercises in France consisted in running at the pasteboard head of a Moor or Turk with a lance, cutting it down with a sword, or firing at it with a pistol. Another of these tests of skill and horsemanship, if not of courage, consisted in carrying off on a lance a whole line of rings, which were suspended for the purpose. The carrousel in France was not known earlier than the reign of Henry IV.; but it had existed for some little time previously in Italy. There were brilliant carrousels under Louis XIII., and two celebrated ones were given in honor of Mademoiselle de la Vallière—the one in Paris in 1662, the other in Versailles in 1664. The place where the first of these fêtes was held has ever since been called the Place du Carrousel. A revival of the carrousel was attempted in Berlin in 1750, and in 1828 the cavalry school in Saumur held one in honor of the Duchess of Berry. In the United States the name is applied to a 'merry-go-round,' or movable platform fitted with wooden horses on which children ride.

CARRUTHERS, kăr-rōō′thẽrz, *or* -rŭᴛʜ′ẽrz, ROBERT (1799-1878). A Scotch journalist and miscellaneous writer. He was born in Dumfries, Scotland, and in early life was apprenticed to a bookseller. In 1828 he became editor, and in 1831 proprietor, of the Inverness *Courier*. He is best known as the biographer and editor of Pope, his *Poetical Works of Alexander Pope* (1853), in four volumes, with subsequent revisions, having been received with great favor. In collaboration with Robert Chambers he published the *Cyclopædia of English Literature* (1843-44). His works include, also, a *History of Huntingdon* (1824), and an annotated edition of Boswell's *Journal of a Tour in the Hebrides* (1851).

CARRUTHERS, WILLIAM A. (c.1800-c.50). An American novelist, born in Virginia. He practiced medicine in Savannah, and wrote two romances dealing with Colonial times—*The Cavaliers of Virginia* (1832), a tale of Bacon's Rebellion, and *The Knights of the Horseshoe* (1845), a tale dealing with Governor Spotswood's famous expedition. The latter book has been reprinted and is one of the best of the romances of its day. Carruthers also wrote *The Kentuckian in New York*, a volume of sketches, and an account of a perilous ascent of the Natural Bridge, printed in the *Knickerbocker Magazine* (1838), and used as a selection in popular readers.

CARS, Railway. See Railways.

CAR'SON, Alexander (1776-1844). A Scottish clergyman. He was born in County Tyrone, Ireland, was educated at Glasgow University, and in 1797 became pastor of a Presbyterian church in Tobermore, or Tubbermore, Ulster, Ireland. In 1805 he turned Independent, and finally (1831), after study of the New Testament for the purpose of refuting Baptist principles, he was converted to those very principles, and published *Baptism: Its Mode and Subjects*. He was not, however, connected with the Baptist organization of England, nor did he recognize 'close' communion. Consult his *Life*, by Moore (New York, 1853).

CARSON, Christopher (generally known as 'Kit Carson') (1809-68). A famous American hunter, trapper, and Western scout. He was born in Madison County, Ky., but when only a year old was taken by his parents to Howard County, Mo., where from 1824 to 1826 he served as a saddler's apprentice. In the latter year he accompanied a party of hunters to Santa Fé, N. Mex., and afterwards devoted himself almost entirely to hunting and trapping. He accompanied an expedition to California in 1829, and another to the Rocky Mountains in the following year, and from 1832 to 1840 was employed as hunter for the garrison at Fort Bent, at the headwaters of the Arkansas. He accompanied Frémont on the latter's expeditions of 1842 and of 1843-44; then spent some time on a ranch, and in 1846-47 served as a guide in Frémont's famous expedition to California. In 1853 he, with a few Mexican drovers, succeeded in driving 6500 sheep to California, and on another occasion, this time unaided, he took fifty horses and mules to Fort Laramie, fully 500 miles from his ranch. In 1854 he was appointed Indian agent for the Utahs and Apaches, at Taos, N. Mex., and in this capacity was able, by reason of his remarkable influence over the Indians, to be of great service to the United States Government. During the Civil War he served the Government with great energy in New Mexico, Colorado, and the Indian Territory, especially against the Confederates in Texas and the Navajo Indians, and in 1865 was brevetted brigadier-general. In the course of his career as a trapper, hunter, Indian-fighter, scout, and Indian agent, he met with many remarkable adventures, some of which read like romance, and he soon came to be regarded throughout the country as the typical frontiersman, resourceful in danger, an adept with the rifle, and skilled even beyond the Indians in woodcraft and the knowledge of wild animals. Consult: Burdette, *Life of Kit Carson, the Great Western Hunter and Guide* (Philadelphia, 1869); and Peters, *Kit Carson's Life and Adventures, from Facts Narrated by Himself* (Hartford, 1874).

CARSON, Joseph (1808-76). An American pharmacist and medical botanist, born in Philadelphia. He graduated at the University of Pennsylvania in 1826, and at the Medical School of the University in 1830, and in 1836-50 was professor of materia medica in the Philadelphia College of Pharmacy. He held a similar chair in the University of Pennsylvania from 1850 to 1876. In 1870 he was president of the national convention for the revision of the Pharmacopœia, and for a number of years he was an associate editor of the *American Journal of Pharmacy*. He edited the *Elements of Materia Medica of Jonathan Pereira* (1843; 2d ed., 2 vols., 1845), and the *Materia Medica and Therapeutics of J. Forbes Royle* (1847), and published the *Illustrations of Medical Botany* (1847).

CARSON CITY. The capital of Nevada, and county-seat of Ormsby County, 31 miles south of Reno, on the Virginia and Truckee Railroad (Map: Nevada, D 2). It is in a picturesque region, near the base of the Sierra Nevada, about 12 miles from Lake Tahoe, and contains the Capitol, Federal building, and a branch mint, which receives immense deposits of silver and gold ore. The State prison is 2 miles southeast of the city, and a United States Government Indian school is three miles to the south. Carson City is in a fertile agricultural region, and is engaged principally in mining, lumbering, and agriculture. Founded in 1858, it became the capital of Nevada in 1861, and was chartered as a city in 1875. Population, in 1890, 3950; in 1900, 2100.

CARSON RIVER. A stream in Western Nevada. It rises in the Sierra Nevada Mountains, south of Lake Tahoe, and flows in a northeasterly course, passing a few miles to the south of Carson City (Map: Nevada, D 2). It is about 150 miles in length to where it divides, one branch flowing north and disappearing in Carson Sink, and the other flowing southward into Carson Lake, a small body of water which appears to have no outlet.

CARSTARES, kär'stârz, or **CARSTAIRS,** William (1649-1715). A Scottish statesman and divine, born at Cathcart, near Glasgow, February 11, 1649. He was the son of the Rev. John Carstares, an extreme Covenanter, and was tutored by Sinclair, minister of Ormiston, East Lothian. He distinguished himself at Edinburgh University and graduated in 1667. Two years later he went to Utrecht to study theology, and there his accomplishments attracted the notice of the Prince of Orange, whose life-long friend and confidential adviser on English matters he became. He returned to England in 1674, and on suspicion of being part author of a pamphlet on Scottish grievances, was first committed to the Tower, then transferred to Edinburgh, and kept in prison until 1679. In 1682 he went to London and negotiated between the English and Scotch conspirators in the Rye House Plot. He was arrested and put to the torture of the thumbscrew, but only partly confessed, when assured that his depositions would not be used against any one. Unfortunately, his evidence, notwithstanding his strenuous expostulations, led to the execution of Baillie of Jerviswood (q.v.). He returned to Holland in 1685, and, acting mainly on his advice, the Prince of Orange planned and carried out the invasion of England in 1688. He accompanied the Prince as chaplain, and when the Prince was established as William III., effected a reconciliation between him and the

Scottish Church. From 1693 to 1702 he wielded great influence in Scottish affairs, and, owing to his authority in Church matters, was nicknamed 'Cardinal Carstairs.' He was elected principal of the Edinburgh University in 1704, and used his influence to increase the patronage of Scottish colleges. In the same year he became minister of Greyfriars Church, and was appointed moderator of the General Assembly, an office to which he was four times elected in eleven years. On a visit to London in 1707 he received a medal and the personal thanks of Queen Anne for his assistance in passing the Act of Union. He succumbed to an attack of apoplexy December 28, 1715, leaving a reputation for scholarship, piety, charity, and political sagacity.

Consult: McCormick, "Life of Carstares," prefixed to *State Papers and Letters Addressed to William Carstares* (London, 1774); Story, *Character and Career of William Carstares* (London, 1874).

CARSTENS, kär'stens, Asmus Jakob (1754-98). A German painter. He was born near Schleswig, May 10, 1754, the son of a poor miller. He was early apprenticed to a wine-merchant, but to procure a better livelihood, he combined with his efforts at trade the drawing of portraits in red chalk. It was in Copenhagen that he first attracted notice by his pictures, "The Death of Balder" and "Ulysses and Æolus." Carstens was made a member of the Academy in Berlin and received from the Court a pension that enabled him to travel and to study the works of the masters in Dresden and Rome. His "The Argonauts with Cheiron" was painted in Italy. The Weimar Museum possesses many of his fine paintings and drawings. Among them his "Fates, Nemesis, Night, and Destiny" is a good example of his manner and style. Many of his drawings represent scenes from the ancient classic poets, as well as subjects from Dante and Shakespeare. Carstens, by his noble drawings, was a worthy precursor of that revival of art in Germany which was to appear later in the works of Cornelius and Overbeck. As a painter his rank is lower than as a draughtsman; he is deficient in color and decorative facility. He followed the Greek ideal, and his classical subjects represented qualities of simplicity and power that had been wanting in the works of his predecessors. Consult: Fr. Pauli, J. *Carstens* (Berlin, 1876); Fernow, *Carstens' Leben und Werke* (new ed. by Riegel, Hanover, 1867).

CAR'STONE, Richard. One of the wards in chancery in Dickens's *Bleak House.* He is a lackadaisical dreamer, who worries himself to death over the will case of 'Jarndyce vs. Jarndyce,' leaving his poor young wife, his cousin Ada, quite penniless, the suit having been dismissed from court owing to the disappearance of the whole contested estate in the expenses of the long litigation.

CART (AS. *cræt*, Icel. *kartr*, from Welsh *cart*, Ir., Gael. *cairt*, cart, diminutive of *carr*, car). A two-wheeled vehicle, usually without top or springs, designed, in most cases, to carry heavy loads and to be drawn by one horse. The cart is doubtless the oldest, as it is the simplest, form of carriage. In its primitive form it consisted of a box or platform mounted on a rude axletree at whose extremities wheels, formed by making transverse sections from a tree-trunk, revolved. To this axletree the poles or shaft were also fastened. The earliest chariots, though elaborately ornamented, were constructed on this simple plan. In modern times carts are used in many countries for agricultural purposes. The one-horse cart is employed by carriers all over Scotland. In France and Germany the carrier's cart is a somewhat heavier vehicle. Long in the body, very strong in construction, and poised on two high wheels with broad rims, this Continental cart carries enormous loads. The *dump-cart* is a vehicle so constructed that it can be unloaded by simply tilting the body of the vehicle. It is much used in the United States for hauling dirt from excavations, and for the removal of ashes and garbage in cities. There is another class of carts or two-wheeled vehicles which are used for pleasure carriages. An example of this class is the *dog-cart*, so called because it was originally made for the conveyance of sporting dogs. Such carts are particularly available for tandem driving (see Driving), and there are many types for both town and country use. An essential feature of a good dog-cart is a mechanical or other device whereby the body or weight may be shifted on the frame so as to secure a proper balance and consequent ease of traction for the horse by removing the weight as much as possible from his back. The *gadabout* is a somewhat low form of dog-cart, while the *Whitechapel cart* is generally built of considerable height and is largely used for tandem driving. The *gig*, a two-wheeled cart with a single seat, modern types of which are known as tilburies and stanhopes, also belongs to this class. The *calash* of Canada, where the driver sits in a low seat in front of his fares, is one of the older forms of cart which still survive. The Irish *jaunting-car*, where two seats are placed back to back lengthwise of the car, and directly behind the driver, is also well known. The *trotting sulky*, which, like the trotting horse, is a peculiarly American product, is another important type of two-wheeled vehicles. In 1892 the pneumatic tire and ball-bearings which had been used with such success on the bicycle were applied to the trotting sulky, and the diameters of the wheels were reduced. The result was a material lowering of the trotting records. There are also numerous other types of two-wheeled carts known as *road-carts*, which, while not possessing a high degree of comfort, are useful and convenient and are easy on the horse. Certain of these are specially designed for breaking colts and others for exercising trotting horses. For a discussion of vehicles in general, see Carriage; Driving.

CAR'TAGE'NA, *Sp. pron.* kär'tȧ-hā'nȧ. An important seaport and one of the chief naval stations of Spain, in the Province of Murcia, situated on a bay of the Mediterranean, 27 miles south-southeast of Murcia (Map: Spain, E 4). It is built partly on the slope of a hill and partly in a plain. The harbor is one of the best on the Mediterranean, capacious enough to hold the largest fleets, with a narrow entrance commanded by fortifications placed on the summits of two volcanic cliffs. There are other defenses nearer the city to the east and west. The city, which is surrounded by walls, is well built and has some wide and good streets, and several fine plazas, notably La Merced, La Constitución, and Del Rey. In the southeastern part of the city is the Castillo de la Concepción, at an elevation of over 225 feet, and of interest for its ruins and magnificent view. Among the more noteworthy structures are the Gothic cathedral, dating from the Thirteenth Century, which in the Middle Ages is said to have been one of the richest in Spain; the Hospital Militar, on a fine site overlooking the sea; the Hospital de la Caridad, which accommodates 600 patients; the Cuartel de Guardias Marinas, and the Presidio. The leading feature of the city is the arsenal, occupying a site on the southwest, which has an extensive equipment of foundries, machine-shops, barracks, hospitals, dockyards, docks, etc., all of its facilities being on a large scale. A marine school also is maintained. Cartagena is an episcopal see, and contains a number of educational institutions, both public and private. Good water is supplied through a new aqueduct. With its suburbs, Cartagena constitutes an important commercial and mining centre, and it is also the seat of considerable industrial interests. Lead, argentiferous ore, iron, manganiferous iron, and some copper and zinc are mined in the vicinity. There are extensive smelting-works, glass-works, and manufactures of esparto grass wares, sailcloth, cordage, soap, pottery, liquors, etc. The tunny fishery and ship-building also are industries of importance. The commerce of the city consists of an export trade in minerals, esparto, oranges, and lemons, and imports of machinery, provisions, coal and coke, timber, etc. Population, in 1901, 103,373.

Cartagena, anciently known as *Carthago Nova* and *Carthago Espartaria*, was founded in B.C. 228 by Hasdrubal. As the Carthaginian headquarters in Spain, it became a town of importance, and had equal influence under the Romans after its capture by Scipio in B.C. 210. In A.D. 425 Cartagena was sacked by the Vandals; early in the Eighth Century it was taken by the Saracens. Saint Ferdinand of Castile captured the city in 1244; but it was retaken, and not until it fell before the arms of James I. of Aragon did it come finally into Christian hands. In 1509 Cardinal Ximenez sailed from Cartagena on the famous expedition against Oran. In the War of the Spanish Succession, it was taken (1706) by an English-Dutch fleet, but was recovered shortly afterwards. It surrendered to the French in 1823. In the political struggles of the Nineteenth Century, Cartagena played comparatively an unimportant part until 1873, when it proclaimed an independent cantonal government. The insurrection was soon put down, but not until the city had suffered a disastrous bombardment.

CARTAGENA, or **CARTHAGENA**. A fortified seaport and capital of the Colombian State of Bolivar, situated on a peninsula where the shore of the Caribbean Sea bends abruptly toward the south to form the Gulf of Darien (Map: Colombia, B 1). Its temperature averages 82° F., and its location is unhealthful. The city is surrounded by the old fortifications and possesses a cathedral, two fine churches, a Government building, a college, seminary, and a theatre. The harbor is a good one, but has a difficult entrance, and has lost its importance since the opening of the harbor at Sabanilla. The town manufactures chocolate and candles, and exports cattle, hides, fine woods, precious stones, and tobacco. Population estimated at 20,000. Cartagena was founded by Dom Pedro de Heredia in 1533, and was an object of attack for English freebooters, who burned it under Drake in 1585. It resisted an assault by the English in 1741, was captured by Spain during the war for independence, 1815, and was retaken by the patriots in 1821.

CARTAGO, kär-tä′gō. The capital of the province of the same name in Costa Rica, Central America (Map: Central America, E 6). It lies about 14 miles southeast of San José, the capital, with which it is connected by rail. It is regularly built, but most of its public buildings bear marks of the earthquakes from which the city has suffered. The town has a considerable coffee trade, and derives much importance from its position on the interoceanic railway. Cartago was known in the Sixteenth Century, having been in existence as early as 1522. As the seat of government it attained to considerable prominence, and in 1823 is said to have contained 30,000 inhabitants. The civil wars and seismic disturbances, however, contributed to its decline, and the capital was moved to San José. Population, in 1892, 3491.

CARTE, THOMAS (1686-1754). An English historian. He was a son of Samuel Carte, the antiquarian and divine, and was born at Clifton. He was educated at Oxford and took his B.A. degree in 1702, then proceeded to Cambridge and attained his M.A. in 1706. He received holy orders in 1707, and was appointed reader at the Abbey Church, Bath; but subsequently as a Stuart loyalist refused allegiance to George I., and resigned. Because he was secretary to Bishop Atterbury and a suspected accomplice in that prelate's conspiracy, £1000 was offered for his arrest, but he escaped to France. He was allowed to return in 1728, and in 1736 published a *Life of James, Duke of Ormonde*, 2 vols. In 1747-55 appeared his *History of England to 1654*, 4 vols. The work is of value for its abundance of materials, to which Hume and other historians have acknowledged their indebtedness. Carte was an indefatigable student. His other works include illustrations for the *History of Thuanus* (De Thou), edited by S. Buckley (7 vols., 1733); and 20 folio and 15 quarto MS. volumes of valuable English historical remains to 1688 are preserved, and have been much drawn upon in the Bodleian Library, Oxford. Carte died April 2, 1754, at Caldecott House, near Abingdon. His *History of England* was republished at Oxford in 1851, 6 vols. Consult: Nichols, *Literary Anecdotes*, Vol. II. (London, 1812-15); and his *Illustrations of Literary History* (London, 1817-58), V., 152-6.

CARTE BLANCHE, kärt bläɴsh (Fr., white paper). A blank paper authenticated with an authoritative signature and intrusted to some one to be filled up as he may think best. Thus, in 1649, Charles II. tried to save his father's life by sending from The Hague to the Parliament a signed *carte blanche* to be filled up with any terms which they would accept as the price of his safety. By a metaphorical application, the term has come to denote unlimited authority, freedom to do as one wills.

CARTEL′ (Fr., It. *cartello*, Med. Lat. *cartellus*, dimin. of *carta*, paper). An agreement relative to the exchange of prisoners. A *cartel-ship*, or *cartel*, is one commissioned to carry prisoners or proposals of any kind between belligerents, and is not permitted to carry an armament (except a gun for making signals), cargo, ammunition, military stores, or instruments of warfare. A violation of the conditions imposed renders a cartel-ship liable to capture and confiscation.

CARTEL, THE. The argument by which the German Conservatives, Imperialists, and National Liberals united in 1887 in support of Bismarck and the Army Bill. See POLITICAL PARTIES, *Germany*.

CARTELLIER, kär't'-lyâ', PIERRE (1757-1831). A French sculptor, born in Paris. He received his first education in art at the Free School of Design, and then entered the studio of the sculptor Bridan. Compelled to support his family, it was not until 1796 that he first exhibited at the Salon. In 1800 he produced the statue of "War" for the southern façade of the Luxembourg. This was followed by "La pudeur" (1801). In 1810 he executed a large bas-relief for the principal door of the Louvre. Among his other works are "Napoleon législateur" (1811), a bas-relief on the Arc du Carrousel and one on the façade of the Hôtel des Invalides, and the mausoleum of Josephine in the Church of Rueil. In 1816 he was made professor at the Ecole des Beaux-Arts.

CAR'TER, ELIZABETH (1717-1806). An English poet, translator, and miscellanist, born in Deal, Kent. She became an expert linguist, and rendered into English de Crousaz's *Examen de l'essai de Monsieur Pope sur l'homme* (2 vols., 1739); Algarotti's *Newtonianismo per le dame*; and (1758) the works of Epictetus. Her poetry has slight value. She was a friend of many of the leading littérateurs of the time, including Johnson, to whose *Rambler* she contributed two papers.

CARTER, FRANKLIN (1837—). An American educator, born in Waterbury, Conn. He was educated at Yale, at Williams, and at the University of Berlin, and was professor of Latin and French at Williams from 1865 to 1868, and of Latin alone from 1868 to 1872. He was then professor of German at Yale from 1872 to 1881, and during this period studied theology and was licensed to preach. In 1881 he became president of Williams, and administered the affairs of the college with great ability until 1901, when he resigned. His publications include an edition of Schiller's *Iphigénie auf Tauris* (1870); a *Life of Mark Hopkins* (1892); and various articles in the *New Englander* and in the *Transactions* of the American Philological Society and the Modern Languages Association.

CARTER, HENRY. See LESLIE, FRANK.

CARTER, JAMES COOLIDGE (1827-1905). An American lawyer, born in Lancaster, Mass. He graduated at Harvard in 1850, and in 1853 was admitted to the bar. He was appointed, in 1875, a member of the commission for devising a form of municipal administration for the cities of New York State, and in 1888 was a member of the constitutional commission. In 1892 he was appointed one of the counsel to present the claims of the United States before the Bering Sea tribunal. His publications include *The Codification of Our Common Law* (1883).

CARTER, LOUISE LESLIE. An American actress who made her début in 1890 in *The Ugly Duckling* at the Broadway Theatre, New York. She was a pupil of David Belasco, the author of the play. After having appeared as the Quakeress in the musical comedy of *Miss Helyett* (1891-93), she retired from the stage for a year and a half more of laborious study at her home in New York. Then, in 1895, as Maryland Calvert, in *The Heart of Maryland* (produced at Washington, October 9), she made a sensation. In April, 1898, with the same play in London, she repeated her American success. In December, 1898, she made her appearance in an adaptation of *Zaza*, which began its long run in New York at the Garrick Theatre, January 9, 1899. In December, 1901, she had another success in *Du Barry*. Consult: Strang, *Famous Actresses of the Day in America* (Boston, 1899); Clapp and Edgett, *Players of the Present*, Dunlap Society Publications (New York, 1899).

CARTER, SAMUEL POWHATAN (1819-91). An American naval officer and soldier, born in Elizabethtown, Carter County, Tenn. He attended Princeton for a time, but did not graduate, and entered the navy in 1840 as a midshipman. Subsequently he was assistant instructor of infantry tactics at the Naval Academy (1851-53), and assistant instructor in seamanship there (1857-61). As a naval officer he served in the Mexican War, and at the capture of the Barrier forts (q.v.) near Canton, China, in 1856. In 1861 he was transferred to the War Department, and organized the troops from East Tennessee. In the army he served with distinction throughout the Civil War, being brevetted major-general in 1865. He then returned to the navy, and from 1869 to 1872 served as commandant of the Naval Academy at Annapolis. He retired from the service in 1881, and received the rank of rear-admiral on the retired list in 1882.

CAR'TERET, Sir GEORGE (?-1680). An English Royalist, Governor of the Island of Jersey and one of the original Lord Proprietors of the Province of New Jersey in America. He early went to sea and by 1633 had risen to the rank of captain in the English Navy. In 1639 he became Comptroller of the Navy, and in 1643, having previously, on the outbreak of the Revolution, espoused the Royalist side, he succeeded his uncle as bailiff of the island of Jersey, and was also appointed Lieutenant-Governor. He soon expelled the Parliamentary forces from the island, and was created a knight and baronet in 1646; but was forced to surrender to the Commonwealth forces in 1651, and for several years thereafter served in the French Navy under Vendôme. Returning to England at the time of the Restoration, he became a member of the Privy Council and Treasurer of the Navy, which latter position he held from 1661 to 1667, when he became Deputy Treasurer of Ireland. He took an active interest in the colonization of America, and in 1650 was granted "a certain island and adjacent islets in America in perpetual inheritance, to be called New Jersey," though no settlement was made at that time. In 1663 he was one of the original proprietors of Carolina, and in the following year the Duke of York granted to him and to John, Lord Berkeley, the territory now included in the State of New Jersey, the name *Nova Cæsarea*, or New Jersey, being given to the province in honor of Carteret's administration of Jersey. The proprietors received full governmental powers and were to pay an annual rental of one pepper-corn, if legally demanded. After the surrender of the province by the Dutch in 1674, a regrant was made, this time with governmental reservations and limitations. On the division of

New Jersey in 1676, Carteret became sole proprietor of East Jersey, which province he left by his will to his widow and to several designated trustees, by whom in 1682, in consideration of £3400, it was transferred to twelve purchasers, who combined with twelve others to form the "Twenty-Four Proprietors of East New Jersey."

CARTERET, John, Earl Granville (1690-1763). A British orator and statesman, born April 22, 1690. His father, first Baron Carteret of Hawnes, died in 1695, and he succeeded to the peerage at five years of age. He was educated at Westminster School and Christ Church, Oxford; in 1706 was created D.C.L., and, according to Dean Swift's humorous assertion, carried away more Greek, Latin, and philosophy than became a person of such high rank. He took his seat in the House of Peers in 1711; spoke in favor of the Protestant succession; received the notice of George I.; and obtained some lucrative appointments. In 1718-19 he was ambassador extraordinary to Sweden, and in 1720 negotiated peace between Sweden, Prussia, and Hanover. In 1721 he was appointed Secretary of State, and in this capacity defended the proceedings of the Government in the Atterbury conspiracy. In 1724 he became Lord Lieutenant of Ireland, and was in frequent consultation, about public affairs, with Dean Swift, who, in spite of numerous disagreements, praised his rule. His Lord-Lieutenancies (1724-26 and 1729-30) were particularly popular. From 1730 to 1742 he was one of the most determined leaders of the opposition in the House of Lords against Robert Walpole, and on his displacement was made a Secretary of State. He became Earl Granville at his mother's death in 1744. The same year he had to resign his seals of office, but continued to receive marks of royal favor, and in 1749-50 was elected and installed Knight of the Garter at Windsor. From 1751 to his death, January 2, 1763, he was lord president of the council under Henry Pelham. Carteret was generally admired for his handsome presence, his classical and oratorical attainments, and for his patriotism, wit, and conviviality; but his opponents, including Pitt, hated him for his haughty contempt of their opinions. Consult: Ballantyne, *Lord Carteret: a Political Biography* (London, 1887); Lecky, *History of England in the Eighteenth Century* (New York, 1878-91); and Mahon, *History of England*, Vols. II.-IV. (London, 1836-54).

CARTERET, Philip (? -1682). First proprietary Governor of New Jersey, appointed by Sir George Carteret and Sir John Berkeley, Lords Proprietors, in 1664. He arrived in August, 1665, at the site of Elizabethtown, which settlement he founded and named in honor of Sir George Carteret's wife, and exerted himself to secure emigrants from the New England Colonies by circulating among them the liberal 'concessions' granted by the proprietors. With the exception of 1673-74, when the western part of New Jersey was held by the Dutch, he acted as Governor of the whole province until its division into East Jersey and West Jersey in 1676, after which until his death he was Governor of East Jersey. The early part of his administration was marked by conflicts with Sir Edmund Andros, Governor of New York, who claimed that New Jersey belonged under his own jurisdiction.

CARTERET, Philip (? -1796). An English naval officer and navigator. In 1766 he reached the rank of commander, and in the same year sailed in command of the *Swallow*, in the expedition sent out under Capt. Samuel Wallis for the exploration of the Southern Hemisphere. On April 11, 1767, while clearing the Straits of Magellan, he became separated from the *Dolphin*, the other vessel of the expedition. He thereupon proceeded in his unseaworthy ship, discovered Pitcairn's Island and the Queen Charlotte Islands, explored the strait (named by him Saint George's Channel) between New Britain (now Neu Pommern) and New Ireland (now Neu Mecklenburg), and corrected errors made in the survey of Mindanao. In 1794 he was retired from active service with a commission of rear-admiral. In view of his small resources and many difficulties, he accomplised much for geographical discovery. His interesting journal is to be found in Hawkesworth, *An Account of the Voyages Undertaken for Making Discoveries in the Southern Hemisphere* (3 vols., 1773).

CARTEROMACO, kär'tå-rô-mä'kô. See Forteguerri, Niccolò.

CAR'TERSVILLE. A city and county-seat of Bartow County, Ga., about 50 miles northwest of Atlanta, on the Western and Atlantic Railroad (Map: Georgia, B 1). It is surrounded by a stock-raising and agricultural region, in which cotton, grain, and fruits are produced, and there are also valuable deposits of iron, manganese, gold, ochre, and other minerals. Population, in 1890, 3171; in 1900, 3135.

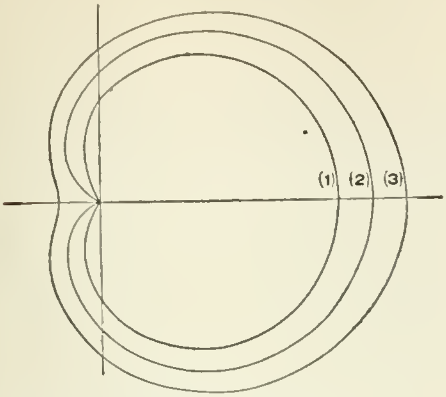
CAR'TERVILLE. A city in Jasper County, Mo., 10 miles west by south of Carthage, the county-seat, on the Missouri Pacific, the Saint Louis and San Francisco, and other railroads (Map: Missouri, B 4). It is in the centre of a highly productive zinc and lead mining district, and has also boiler-works, iron-works, foundry and machine shops, etc. Carterville was settled in 1875. Population, in 1890, 2884; in 1900, 4445.

CARTE'SIANISM. The system of philosophy advocated by Descartes (q.v.) and his followers. (See Geulincx; Malebranche; Arnauld, Antoine.) Spinoza and Leibnitz had their point of departure in Cartesianism, but introduced modifications so significant that they are not generally reckoned in the school. The literature of the subject is enormous. Consult, especially: Bouiller, *Histoire de la philosophie Cartésienne* (3d ed., Paris, 1868); and Kuno Fischer, *Geschichte der neueren Philosophie*, Bd. I., translated by J. P. Gordy, under the title of *Descartes and His School* (New York, 1887).

CARTESIANS, kär-tē'zhans. The name of a group of curves discussed by Descartes in connection with the study of optics. In general they are curves of the fourth order, having two cusps. Common forms of these curves are the cardioid and limaçon (q.v.). The Cartesian equation $(x^2 + y^2 - px) = m^2(x^2 + y^2)$ shows the relation between these special forms.

The first case gives the curve marked (1), a limaçon; the second case gives the curve marked (2), a cardioid; and the third the curve marked (3), an outer oval. The Cartesians, consisting of double ovals, are curves of the sixth class; those which reduce to limaçons are of the fourth class;

and those which reduce to cardioids are of the third class. A curve in space defined as the locus of a point whose distances from three fixed points are connected by two linear relations is called a twisted Cartesian. See also CASSINI and CASSINIAN OVAL.



(1) If $p > m$. the origin is a double point.
(2) If $p = m$, the origin is a cusp.
(3) If $p < m$, the origin is a conjugate point.

CAR'THAGE (Lat. *Carthago*, Gk. Καρχηδών, *Karchēdōn*). The greatest city of antiquity on the north coast of Africa, situated in about latitude 36° 50′ N. and longitude 10° 20′ E., near the modern Tunis, on a peninsula extending into a small bay of the Mediterranean Sea. It was founded, according to legend, by Dido (q.v.), a Phœnician queen, who had fled from Tyre after the murder of her husband; but more probably it originated in an emporium or factory established by the colonial merchants of Utica, and the capitalists of the mother city Tyre, on account of the convenience of its situation. The native name of the city seems to have been Kart Hadisha, the 'new town,' probably with reference to Tyre, which was always recognized by the Carthaginians as their mother city. Unfortunately, we know very little of its growth. Our information only begins after Carthage had become one of the greatest commercial cities of the world, and we have but very scanty and one-sided accounts of it even then. The number of inhabitants in B.C. 149, just before the Third Punic War, is said to have been about 700,000. The population was partly of Phœnician, partly of Libyan descent. The territory which the Carthaginians acquired by the subjugation of the Libyan tribes, and by the ultimate annexation of other older Phœnician colonies, with which they had at first been simply in alliance, such as Utica, Hadrumetum, Hippo, the two Leptes, etc., extended in the middle of the Fifth Century B.C. southward to Lake Triton, eastward to the Great Syrtis, and westward to the Atlantic. At first, Carthage was essentially a mercantile city, and even paid a ground-rent to the Libyan tribes until the Fifth Century. It was the maritime power of the Carthaginians which enabled them to extend their settlements and conquests to the other coasts of the Mediterranean. At the beginning of the Sixth Century B.C., Carthage appears as the ally of the Phœnicians in Sicily, now crowded by the Greeks into the western part of the island. After checking the Greek advance and founding colonies of their own, the Carthaginians reduced the coasts of Sardinia. Hanno (q.v.) founded colonies on the west coast of Africa beyond the Straits of Gibraltar, and Himilco visited the coasts of Spain and Gaul.

With the establishment of this control over the western Mediterranean, Carthage also established her trading policy. No foreign traders were allowed at any of her western colonies, and only the harbors of Carthage were open to foreign ships. All traders found elsewhere were drowned. This policy led the Carthaginians to form an alliance with the Etruscans, and in B.C. 540, in the battle of Alalia, they checked the attempts of the Greeks to encroach upon their territory. Massilia (Marseilles) alone held its position on the coast of Gaul. The first treaty with the Romans was concluded in B.C. 509, the second in B.C. 348, the third in B.C. 306. The connected history of Carthage begins with the Fifth Century B.C., a period of wars between the Carthaginians and the Greeks in Sicily. The Carthaginian army under Hamilcar was destroyed by Gelon, at Himera, in B.C. 480, and for a time the Greeks were free from attack. In B.C. 410 wars broke out anew, and the Greek cities of the southern coast of Sicily were plundered and destroyed. At Syracuse the pestilence compelled the Carthaginians to raise the siege, and under the leadership of Dionysius I., the tyrant of Syracuse, the Greeks recovered much of their lost territory. After several unsuccessful attempts to drive the Carthaginians from the island, Dionysius, in B.C. 383, made a treaty which gave them the land west of the river Halycus. A later invasion of the Carthaginians was repelled by Timoleon (q.v.), in B.C. 343, but thirty years later, when Agathocles was tyrant of Syracuse, the war began again, and Syracuse was once more besieged. Deserting his city, Agathocles crossed to Africa, and for three years ravaged the almost defenseless territory of Carthage, though not strong enough to attack the city. After his death the Carthaginians again increased their dominions in Sicily, and although Pyrrhus contended successfully against them at first, he left that island entirely in B.C. 275.

The subjugation of southern Italy by the Romans brought the two great conquering nations into collision, and the First Punic War arose (B.C. 264), and after a great naval victory of the Romans, terminated in B.C. 241, the Carthaginians giving up Sicily, and paying to the Romans a large sum of money. Soon after this a mutiny of the hired troops of Carthage, combined with an insurrection of the Libyan tribes, the ancient inhabitants of the country, who were kept down by the arbitrary rule of the Carthaginian colonists, threatened the entire ruin of the city. Hamilcar Barca brought this bloody war to a successful termination, but Carthage, crippled by the struggle, was unable to prevent the Romans from seizing Sardinia and Corsica. About B.C. 236 Hamilcar Barca led an army to Spain, where he, and, after him, his son-in-law, Hasdrubal, obtained great successes. Here was founded New Carthage, now Cartagena (q.v.). After Hasdrubal's death (B.C. 221), Hannibal (q.v.), burning to revenge the defeat which his native city had sustained from the Romans, attacked and took Saguntum, a city on the Ebro, allied with Rome (B.C. 219). Thus began the Second Punic War, in which Hannibal pursued his career of conquest from Spain, through Gaul, and across the Alps into Italy itself, defeated the Romans with terrible slaughter in various battles, and, by that of Cannæ in particular, brought Rome to the very brink of ruin. Yet the war terminated in the total defeat of the Carthaginians by Publius Cornelius Scipio, who overthrew their power in Spain and was victorious over Hannibal in the final and decisive battle of Zama, in Africa, in October, 202. A peace was then concluded, in which the Carthaginians were limited to their African territories, while most of their ships of war and war elephants were taken from them, besides an immense sum of money, and they were bound not to make war without permission of the Romans. Massinissa, King of Numidia, skillfully availed himself of dissensions which arose within Carthage between the nobles and the people, to advance his own interests at the expense of the Carthaginians; and as they (B.C. 151) opposed him, and drove his adherents out of the city, the Romans seized the opportunity for a new declaration of war (B.C. 149), on the ground that the treaty was broken, and after a siege of two years Carthage was taken by Publius Cornelius Scipio Æmilianus (B.C. 146). For six days the combat was maintained in the streets of the city, and for seventeen days the work of its destruction by fire was carried on by the conquerors. The country became a Roman province. Gaius Gracchus sent out 6000 colonists to found a new city on the site of Carthage. It was called Junonia, but it did not prosper. Augustus, carrying out the intention of his great uncle, restored the city, in B.C. 29, and the new Carthage had become, in the Second and Third centuries of the Christian Era, one of the finest cities of the Roman Empire. In A.D. 439 Genseric made it the capital of the Vandal kingdom; Belisarius conquered it in 533, and named it Justiniana; the Arabs under Hassan utterly destroyed it in A.D. 647; and now only two or three small hamlets and a few ruins mark its site. Remains of the ancient walls, and possibly of the harbors, have been found, and recently many graves of Punic and Roman times, yielding many inscriptions and smaller objects, have been opened.

We have not very satisfactory accounts of the constitution of the Carthaginian State. It was highly esteemed by Aristotle, but his account of it has perished, and our information is scattered; nor is it certain that it remained entirely unchanged. At the nominal head were two *suffetæ* (Hebrew, *shofetim*, 'judges' in the Bible), who seem to have been chosen by the people on the nomination of the Senate. The nobles, who seem to have needed money as well as birth to maintain their position, seem to have formed a Senate of 300, from whom a body of 30 (including the *suffetæ*) were chosen to carry on the ordinary government. Later we hear of the introduction of a body of 104 judges, who seem to have had supreme power over all officials, including the generals, and, like the Council of Ten at Venice, to have become the real rulers of the State. We can gather dimly, from various scattered statements, that the Carthaginian oligarchy, while despising the multitude, was itself split up into factions and torn by family jealousies. On the other hand, our knowledge of Carthage comes chiefly from her enemies, and the government, though not always consistent in policy, and undoubtedly oppressive to its subjects, was remarkably free from revolution or even popular uprising.

The Carthaginian Army was raised from the conscription of the subjugated Libyans, from the hired Numidians, and mercenaries from Spain, Gaul, and, indeed, all parts of the world. The soldiers had no interest in the State, but were capable of becoming strongly attached to their generals, and in good hands were a formidable force, as is seen in the successful campaigns of Hamilcar Barca and Hannibal. In the time of Agathocles the city sent forth 40,000 heavy-armed infantry, 1000 cavalry, and 2000 war chariots, but the State could easily raise 100,000 troops. The fleet in the First Punic War consisted of 350 ships, carrying 150,000 men. How Carthage contrived to raise revenue sufficient to cover the enormous expense her military and naval organization involved is not very clear. It was, in all likelihood, derived from tribute imposed on subject Libyan or Numidian races, in great part from mines in Spain, and from import duties derived from her maritime and inland trade, which was prodigiously great. Her merchantmen visited every coast and island of the Mediterranean, and even ventured as far as the Azores, Britain, the Baltic, etc.; while her caravans penetrated through Sahara to the gold-producing districts of the Niger, and through the Libyan Desert to the lands along the Nile. Still, Carthage was by no means an exclusively mercantile State. Many of her wealthiest citizens derived their income from large estates cultivated by bands of slaves, and the only Punic literature the Romans thought worth preservation was a treatise on agriculture by Mago, which was translated into Latin by order of the Senate, for the benefit of the Roman husbandmen.

The religion of the Carthaginians appears to have been substantially the same as that of the Phœnicians—a worship of the stars and of fire. Moloch was the chief deity, and to him children and captives were sacrificed. The highest natural manifestation of this deity was the sun. Besides Moloch, the Carthaginians worshiped the Tyrian Melcart; Astarte, the moon goddess; Esmun, also called Asclepios by the Greeks; and a few of the Greek divinities, of whom a knowledge had been obtained in Sicily. It does not appear that there was a distinct sacerdotal order in Carthage. Probably religious ceremonies were performed by the dignitaries of the State, but our knowledge on this interesting point is too meagre to permit of our arriving at any very definite conclusion. Consult: A. Church, *Carthage, or the Empire of Africa* (New York, 1886); R. B. Smith, *Carthage and the Carthaginians* (London, 1877); Meltzer, *Geschichte der Karthager* (Berlin, 1879, 1896); Audollent, *Carthage romaine* (Paris, 1901); N. Davis, *Carthage and Her Remains* (London, 1861); Ch. E. Beulé, *Fouilles à Carthage* (Paris, 1860); E. de Sainte-Marie, *Mission à Carthage* (Paris, 1884); *Atlas archéologique de la Tunisie* (Paris, 1893). For recent discoveries, see *Comptes Rendus de l'Académie des Inscriptions et Belles Lettres*, Vol. XXVIII. (Paris, 1901).

CARTHAGE. A city and county-seat of Hancock County, Ill., 32 miles south of Burlington, Iowa, on the Wabash and the Chicago, Burlington and Quincy railroads (Map: Illinois, A 3). It is the seat of Carthage College (Lutheran), opened in 1872. Settled in 1837, Carthage was chartered as a city in 1883. Population, in 1890, 1654; in 1900, 2104.

CARTHAGE. A city and county-seat of Jasper County, Mo., 150 miles southeast of Kansas City, on Spring River, and on the Missouri Pacific, the Saint Louis and San Francisco, and other railroads (Map: Missouri, B 4). It has lead and zinc mines, stone and lime works, foundries, flour-mills, bed-spring and furniture factories, and plants for the manufacture of plows, woolen goods, and ice. The principal articles of export are stone, marble, grain, fruit, poultry, and live stock. The city has two parks, a handsome county court-house, and a public library (Carnegie), and is the seat of Carthage College. Settled in 1833, Carthage was destroyed during the Civil War, and was entirely rebuilt after 1866. It was incorporated in 1873, and is governed under a charter of 1890, providing for a mayor, elected every two years, and a city council. The electric-light plant is owned and operated by the municipality. On July 5, 1861, a force of about 3500 Confederates, under Generals Jackson and Price, met a Union force of about 1500, under General Sigel, seven miles east of Carthage, and in the battle which ensued the former lost about 200, and the latter about 50, in killed and wounded. After several hours of fighting General Sigel, to prevent the Confederate cavalry from outflanking him and cutting off his baggage-train, fell back in good order to Carthage. Population, in 1890, 7981; in 1900, 9416.

CAR'THAGE'NA, *Sp. pron.* kär'tȧ-hä'nȧ. See CARTAGENA.

CARTHA'GO NO'VA, Spain. See CARTAGENA.

CAR'THAMINE, or **CARTHAM'EINE** (Fr. *carthamine*, from Neo-Lat. *Carthamus*, from Ar. *qirtim*, *qurtum*, Carthamus, from *qarṭama*, to cut off), $C_{14}H_{16}O_7$. A natural dye obtained by a chemical process from safflower (*Carthamus tinctorius*) in crystals which are insoluble in water, but slightly soluble in alcohol and ether. When newly precipitated, carthamine immediately and permanently attaches itself to cotton or silk (but not to wool) requiring no mordant, dyeing the fabric a fine red, which is changed to yellow on the addition of alkalies, and may be returned to red again on being treated with acids. When fused with caustic potash, it is transformed into para-oxy-benzoic acid.

CARTHU'SIANS. A monastic order which owes its origin to Saint Bruno (q.v.), who retired in 1086, with six companions, to the solitude of La Chartreuse (whence the name), near Grenoble, where they built hermitages, wore rude garments, and lived upon vegetables and coarse bread. The fifth prior, Guigo (died 1137), composed a body of rules, called the *Statuta Guigonis*, or *Consuetudines Cartusiæ*, but they have often been changed. After 1170, when the order received Papal approbation, it extended rapidly. It dates from 1180 in England, where the name of Chartreuse Houses was corrupted into Charter Houses. The order is now conducted under the rules approved in 1682 by Pope Innocent XI. The Carthusians were divided into two classes—fathers (*patres*) and lay brothers (*conversi*). Each father occupied a separate cell, with a bed of straw, a pillow, a woolen coverlet, and the means of manual labor or of writing. They left their cell, even for meals, only on festivals and on days of the funeral of a brother of the order. Thrice a week they fasted on bread, water, and salt, and there were several lengthened fasts in the year. Flesh was forbidden at all times, and wine, unless mixed with water. Unbroken silence, except on rare occasions, was enforced, as well as frequent prayer and night watching. These austerities were continued, with little modification, by the modern Carthusians. The order at one time counted sixteen provinces, and boasted of the most magnificent convents in the world—as La Grande Chartreuse (see CHARTREUSE, LA GRANDE), in France, and in Italy the Certosa di Pavia, 18 miles south of Milan. The former is still in such use; the buildings date from 1676. The buildings of the latter date from 1396, but are now preserved only as a national monument, the monasteries having been suppressed in Italy. The Carthusians were given to hospitality and works of charity, and were, on the whole, better educated than the mendicant orders. Their principal seats were in Italy, France, and Switzerland; but they have shared the fate of the other monastic establishments, and their convents are now, for the most part, solitudes indeed. The Carthusian nuns arose at Salette, on the Rhone, in France, about 1229. They followed the rules of the Carthusian monks, but with some mitigations, of which the most notable is that they have a common refectory. When the monasteries were suppressed under Henry VIII., there were nine Carthusian monasteries in England. To-day there is one, near Steyning, eight miles northwest of Brighton. See CHARTERHOUSE.

CARTIER, kär'tyȧ', Sir GEORGE ETIENNE (1814-73). A Canadian politician. He was educated at Saint Sulpice, Montreal, and was admitted to the bar in 1835. He was one of the 'rebels' in the abortive Revolution of 1837-38, but was pardoned, and became, in succession, a member of the Provincial Legislature, Provincial Secretary, and Attorney-General. In 1858 he became Premier in the Cartier-Macdonald administration. He was instrumental in abolishing feudal tenure in Lower Canada, in making the Legislative Council elective, in codifying the civil laws, and in decentralizing the judiciary, and labored earnestly for the confederation of the Canadian provinces.

CARTIER, JACQUES (1494-c.1557). A French explorer, born at Saint-Malo. He acquired a reputation as a bold navigator, and was selected by Admiral Chabot to lead an expedition to the northeastern coast of North America, for the purpose of discovering a passage to Cathay. With two ships he sailed from Saint-Malo in 1534. He sighted Newfoundland, near Cape Bona Vista, and followed the coast southward to a point nearly opposite Cape Breton; then, turning westward, made Prince Edward Island, and gave its name to the Bay of Chaleurs. He then skirted the northern coast of Anticosti Island, and returned along the shores of Labrador. At Cape Gaspé he landed, erected a cross, and took possession of the country in the name of France. The next year, with another fleet, under the royal commission, he sailed up the Saint Lawrence. Leaving his ships moored near the Indian village of Stadacona, on the site of the modern Quebec, Cartier, with a few followers, pushed on to the fortified village of Hochelaga, which lay at the foot of an imposing hill called by the explorer Mount Royal (Montreal). The late season—it was October—made it imprudent to proceed farther. He returned to his ships, and spent the winter, amid much suffering from cold and illness among his crew. When spring came the adventurers sailed for home, taking with them the Indian chieftain of Stadacona, whom they had kidnapped. Cartier's account of this voyage has survived, and is known as the *Bref Récit*. European complications absorbed the immediate attention of the French King, but four years later (1540) he sent out to the New World Jean François de la Roche, sieur de Roberval, as viceroy. Cartier was made captain-general and pilot of the fleet. Owing to some delay in the equipment of the expedition, Cartier set sail with but three ships, in May, 1541. After waiting for Roberval in vain for six weeks on the coast of Newfoundland, he proceeded up the Saint Lawrence, and in August found himself once more at Stadacona. He fortified a position near Cape Rouge, and called the post Charlesbourg. Two of his ships were sent back to meet Roberval, concerning whose movements the evidence is confused when not contradictory. What seems certain is that the viceroy and his fleet were off Newfoundland in June, 1542, and that he there met with Cartier, who was returning to France after the winter at Charlesbourg, taking with him what he erroneously supposed to be gold ore. He had seen little of the Indians during the winter. Cartier was well received by his sovereign, who presented him with a manor near his native town. Lescarbot tells us that Cartier made a later voyage to rescue Roberval; but if so, no data exist respecting it. The principal authority concerning Cartier is François Joüon des Longrais, *Jacques Cartier* (Paris, 1888), which contains the important documents throwing light on his career. For shorter biographies of Cartier, consult: Joseph Pope (Ottawa, 1890); Hiram B. Stephens (Montreal, 1890); and N. E. Dionne (Quebec, 1889). The *Transactions* of the Royal Society of Canada (Ottawa, 1897) contain several important studies of the route and the exact localities visited by Cartier.

CARTILAGE (Fr., from Lat. *cartilago*, gristle). A firm elastic substance, of a pearly whiteness, presenting to the unaided eye a uniform and homogeneous appearance. Cartilages may be divided into the *temporary*, the *permanent*, and the *accidental*. The *temporary* cartilages are substitutes for bone in the earlier periods of life, and after a certain time become replaced by bone. (See BONE.) At birth the extremities and larger eminences of the long bones and the margins of the flat bones are still cartilaginous, and this cartilage does not altogether disappear till the period of puberty. The *permanent* cartilages are either *articular* or *non-articular*. *Articular* cartilages are attached to the extremities of bones, and enter into the formations of joints. *Non-articular* cartilages are usually more flexible than the articular. They are sometimes attached to bones, to lengthen them out, as, for instance, in the nose, or the auditory canal. (See EAR.) In other cases they form the bases of distinct organs, as the larynx, the trachea, and the eyelids. *Accidental* cartilages are cartilaginous concretions, which are occasionally found in situations where they do not normally occur, and are of no general interest. The physical properties of cartilages, especially their elasticity, resisting power, and incapability of extension, are such as to fit them admirably for the functions which they have to perform in the animal economy.

Cartilage belongs to the group of tissues termed connective tissues. The matrix or intercellular portion of cartilage is dense and firm, and the different varieties of cartilage are recognized by the nature of the matrix. In the variety called *hyalin cartilage*, the matrix is apparently homogeneous, though Leidy has shown that it is really composed of bundles of fine fibrous connective tissue. Lying in this matrix are the cartilage-cells. These are oval or irregular, granular, nucleated bodies, and are arranged singly, in pairs, or in fours. The cartilage-cell or group of cells is surrounded by a clear cell-space. Hyalin cartilage is the form of cartilage which makes up the skeleton in the embryo, and in which the bones of the body with the exception of the head and face are developed. In the adult it is found as articular cartilage, the cartilages of the nose, Eustachian tube, larynx, trachea, bronchi, costal cartilages, etc. In the variety called *fibro-cartilage*, the matrix is composed of fibrous connective tissue, in which are imbedded the cartilage-cells. These cells may occur singly or are more commonly arranged in rows of two or more, lengthwise of the bundles of fibres. Fibro-cartilage is found in the intervertebral disks, and around the edges of some joints. In the variety called *elastic cartilage*, the matrix is rich in elastic fibres, giving the tissue a glistening yellow appearance. The cells are situated in cell-spaces and may occur singly or in pairs, resembling the arrangement noted in hyalin cartilage. Some of the smaller cartilages of the body are of this variety, the epiglottis, part of the Eustachian tube, the external ear-cartilage, the arytenoid cartilages, etc. Consult Stöhr, *Text-Book of Histology* (Philadelphia, 1901).

CAR'TILAG'INOUS FISHES. See ELASMOBRANCHII; FISH.

CARTOG'RAPHY. See MAP; CHART; and SURVEYING.

CAR'TOMAN'CY. See SUPERSTITION.

CAR'TON, SYDNEY. A character in Dickens's *Tale of Two Cities*, the friend of Charles Darnay, for whom he renounced his love for Lucy Manette, and in whose stead he was guillotined.

CARTOON' (Fr. *carton*, from Lat. *carta*, paper). A design on strong paper, of the full size of a work to be afterwards executed in fresco, oil, tapestry, mosaic, or stained glass. The object of the artist in preparing a cartoon is to adjust the drawing and composition of his subject in circumstances in which alterations can be effected with facility, before proceeding to the execution of the work itself. Cartoons are generally composed of a number of sheets of stout paper pasted together at the edges, and stretched on a frame. The cartoon, when finished, is transferred to the canvas or plaster on which the work is to be executed, either by tracing with a hard point, or by pricking with pins (a process called 'pouncing'), charcoal in both cases being rubbed on the back of the drawing. In fresco (q.v.) painting, the plaster on which the work is executed must be kept wet, in order that it may absorb the color, and consequently only a small portion can be executed at a time. For this reason, the cartoon must be traced in small compartments of the size that the artist can finish without stopping. It is here, consequently, above all, that the necessity for the previous execution of a cartoon is greatest, as it would be impossible to sketch the whole design on the plaster in the first instance. In weaving superior tapestries, like the gobelins, it is the present practice to cut out all the figures represented, which are always in color, and place them behind or under the wool. The great masters of the Renaissance used such studies in chiaroscuro as guides to them in almost all their decorative works, and many of these monuments of their care, as well as of their genius, have been preserved. They are quite as interesting, and often rise to the dignity of the fresco and oil work. The most celebrated surviving examples of the fifteenth century are Andrea Mantegna's nine cartoons of the "Triumph of Julius Cæsar," long used as hangings in the ducal palace at Mantua, but now at Hampton Court. They are probably the artist's greatest achievement, and represent more adequately the antique feeling of the Renaissance than any work of the century. Epoch-making in Italian painting were the cartoons of incidents from the war with Pisa, painted in rivalry for frescoes in the Palazzo Vecchio, Florence, by Michelangelo and Leonardo da Vinci. In neither case was the fresco completed, and the cartoons have been destroyed; but so great was their influence upon the younger artists, especially in the case of Michelangelo's, that they may be said to have revolutionized Florentine painting. The central feature of Michelangelo's cartoon was a group of bathing soldiers surprised by the enemy, of Leonardo's a fierce battle over a standard. Less important in the history of painting, but equally well known by reason of their survival, are the cartoons which Raphael designed, at the command of Leo X., for the twelve tapestries of the Sistine Chapel. Of the originals, depicting scenes from the lives of Christ and the apostles, seven survive in the South Kensington Museum; they were purchased by Rubens for Charles I., saved by Cromwell, who commanded that they should be purchased for the nation, and preserved from neglect by William III. Among the best subjects are "Paul Preaching at Athens," "Christ Delivering the Keys to Peter," and "The Miraculous Draught of Fishes." In conception and design they belong to the very best work Raphael ever created. Of the tapestries woven in Flanders after these designs, one set is in the Vatican, and part of another in the Berlin Museum. Others of Raphael's cartoons, for the most part in repainted condition, survive; of especial interest is the beautiful design for the "School of Athens" in the Ambrosiana, Milan. There are four good examples by Giulio Romano in the Louvre, and cartoons by Italian painters of the seventeenth century, notably the Carracci and Domenichino, also survive. Owing to the disuse of fresco-painting at the present day, cartoons are but seldom produced. At the beginning of the nineteenth century, however, the school of Munich, founded by Peter von Cornelius, was essentially a school of cartoonists. Its leaders almost confined themselves to this work, leaving the execution of the frescoes to their pupils, much to the detriment of the color. Besides Cornelius, whose best cartoons, notably the "Apocalyptic Riders," hang in the Berlin Museum, the greatest cartoon-painter of the school was Kaulbach. Consult especially the biographies of the artists mentioned above. The name 'cartoon' is also applied to full-page sketches in journals and other publications, mostly of a comic nature. See the article CARICATURE.

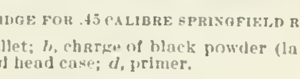
CARTOUCH, kär-tōōch′ (Fr. *cartouche*, It. *cartoccio*, from Lat. *carta*, paper). A military term for the cartridge pouch or box carried by soldiers of the French Army. The ammunition-pouch of the British soldier was formerly known as a cartouch. The name originally described a wooden case containing from two to three hundred musket-bullets, and eight or ten one-pound balls, fired from a mortar or howitzer in the defense of a ditch or intrenchment.

CARTOUCHE, kär′tōōsh′. A term used by the French for certain oval ornaments or shields employed in art and architecture. The word is perhaps best known as the technical term for the oval frame with a sort of handle which inclosed the names of Egyptian kings in hieroglyphic inscriptions. Originally it was the hieroglyph for the word *ran*, 'name.' The term is sometimes applied to modillions or brackets supporting a cornice.

CARTOUCHE, kär′tōōsh′, LOUIS DOMINIQUE (1693-1721). The leader of a band of robbers and assassins, whose crimes created terror in Paris. For many years he eluded the police, but at last was arrested, and after a long trial, which aroused a great deal of interest, was sentenced to death, and broken on the wheel at Châtelet. His life afforded the basis for numerous plays. Consult Maurice, *Cartouche, histoire authentique* (Paris, 1859).

CAR-TRANSFER BOATS. See FERRY.

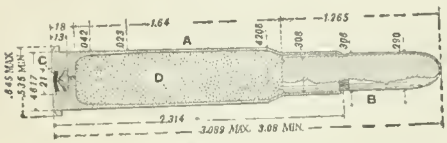
CARTRIDGE (corrupted from *cartouche*). The whole or a portion of the charge for a firearm put up in a bag or case. A cartridge for small arms consists of a brass cartridge-case filled with powder and fitted with a primer and having its open end closed by the bullet, which is firmly crimped in place.



BALL CARTRIDGE FOR .45 CALIBRE SPRINGFIELD RIFLE (U. S.).

a, lead bullet; *b*, charge of black powder (later, smokeless); *c*, solid head case; *d*, primer.

The first cartridges were designed for muzzle-loading small arms, where projectile and charge were tied together and inserted in one bundle. For many years prior to the Civil War, small arms were furnished with cartridges containing ball and charge in paper which was torn and the powder poured into the bore, followed by the ball. Similar cartridges were used with the first breech-loaders, but the escape of gas out of the breech and into the mechanism gave trouble, and metallic cartridge-cases which served also to check the escape of gas had to be adopted. They were first of copper, with folded head, in the rim of which was the priming composition (rim-fire). In addition to danger of accidental discharge, the cases were weak where folded and sometimes burst. A folded-head case, with a cup to keep gas out of the fold, was then introduced; and at the same time the composition was put opposite the centre of the head, resting on the cup which formed an anvil on which it could be exploded (cup-anvil). This was followed by a brass case with solid head, made in one piece by drawing. The primer was outside the case in a small cap.



(Dimensions in inches.)

BALL CARTRIDGE FOR .30 CALIBRE U. S. MAGAZINE RIFLE.

a, solid head case; *b*, bullet of lead with steel jacket; *c*, primer; *d*, charge (smokeless powder).

Machine guns were made possible by metallic small-arms ammunition, and they in turn developed it. Increasing in calibre and developing into the rapid-fire gun, they naturally continued to use metallic-case fixed ammunition. Difficulties of manufacture of the larger cases have been overcome, cases as large as desired being now drawn from one piece in dies, as are small-arms cases, while formerly the larger sizes had to be built up of drawn tubing riveted to the head. In the United States land and naval service, and as a general rule abroad, guns of five-inch calibre and less have cartridges of this sort. Six-inch guns have a metallic case for the powder-charge, but, on account of weight, the projectile is inserted separately. Larger guns have the powder-charge put up in bags, the projectile being separately loaded. Eight-inch guns have the powder-charge put up in two sections; ten and twelve-inch, in four for convenience in handling. See AMMUNITION.

A *blank cartridge* is one which does not contain a projectile. It is used for salutes, for practice, and for signals.

A *dummy cartridge* contains no powder. It is used for drill purposes only. By practicing with dummies instead of loaded cartridges the danger of handling the latter is avoided without much loss of efficiency in the drill, if the dummies are properly designed.

CARTRIDGE-PAPER. A strong paper, originally manufactured for soldiers' cartridges, and also used by artists, its rough surface being useful for certain kinds of drawing; the name is also given to a class of wall-papers of similar texture.

CART'WRIGHT, EDMUND (1743-1823). An English clergyman, inventor of the power-loom. He was born April 24, 1743, at Marnham, Nottinghamshire, England. Educated at Oxford, he obtained a living in the English Church, and devoted himself to his ministerial duties and to literature, until a casual conversation, in 1784, directed his attention to machinery, and in 1785 he exhibited his first power-loom (see LOOM), in an ingenious though very rude machine, upon which, however, he subsequently effected improvements. Its introduction was vehemently opposed, and a mill fitted up with 400 of his looms was ignorantly and maliciously burned down. Cartwright, in 1789, took out a patent for a wool-carding machine, and secured patents for various other improvements in manufacturing and other machinery. In 1797 he patented a steam-engine in which alcohol was the fuel employed. He also assisted Robert Fulton in his steamboat experiments. But his patents yielded him little return, and in 1809 the British Government, in consideration of his inventions, granted him £10,000. He died October, 1823. His daughter published a *Life* (London, 1843).

CARTWRIGHT, JOHN (1740-1824). An English politician and pamphleteer, popularly known as Major Cartwright, and surnamed 'The Father of Reform.' He was a brother of Edmund Cartwright the inventor, and was born at Marnham, Nottingham, September 28, 1740. He entered the navy at eighteen; in 1758 was present at the capture of Cherbourg, and the following year fought in the action between Hawke and Conflans. Afterwards he went to the Newfoundland station, and for five years ably discharged the duties of chief magistrate, to which he was appointed. At the outbreak of the American Revolution, he espoused the cause of the Colonies; declined to fight against them, resigned, and in 1774 published *American Independence the Glory and Interest of Great Britain*. He received an appointment as major in the Nottingham militia, but after seventeen years of service, partly on account of his sympathy with the Revolution in France, was superseded. With honesty of purpose, by voice and pen he worked for manhood suffrage, the ballot, annual Parliaments, the improvement of national defenses, the liberties of Spain and Greece, and other popular causes. In 1813 he was arrested for plain-speaking, but soon released, and in 1820 was indicted for sedition and fined £100. He died September 23, 1824. In 1831 a monument by Macdowell was erected to his memory in Burton Crescent, London. His writings are comprised in a list of eighty books and tracts given in *The Life and Correspondence of Major Cartwright*, edited by his niece, F. D. Cartwright (2 vols., London, 1826).

CARTWRIGHT, PETER (1785-1872). An American clergyman. He was born in Virginia, but in early life settled in Kentucky, where, in 1806, he became a circuit-rider in the Methodist Episcopal Church, and later a presiding elder, preaching everywhere throughout Kentucky and Tennessee. In 1824 he removed to Illinois, where he continued his work. He was a zealous worker, and in the course of thirty-three years preached as many as 15,000 sermons, and baptized 12,000 converts. He was widely known for his homely but powerful preaching, and interesting stories are told of his daring and romantic adventures among the rough backwoodsmen. Many of these can be found in his *Fifty Years a Presiding Elder*, and in the *Autobiography of Peter Cartwright* (New York, 1856). Consult, also, Stevens, *Observations on Dr. Cartwright* and *The Backwoods Preacher* (London, 1869).

CARTWRIGHT, Sir RICHARD JOHN (1835—). A Canadian statesman, born in Kingston, Ontario. He was educated at Trinity College, Dublin, and on his return to Canada studied law, but relinquished its practice in order to engage in banking. He made a thorough study of financial questions, and in 1863 entered public life as a Conservative member of the Legislative Assembly. He joined the Liberal Party in 1870, held the portfolio of finance in the Mackenzie Ministry from 1873 to 1878, and in 1896 became Minister of Trade and Commerce in Sir Wilfrid Laurier's Cabinet. He was the first Canadian statesman of importance to consider the subject of annexation to the United States as a practical question in Canadian politics. In 1898 he was a member of the Anglo-American Joint High Commission.

CARTWRIGHT, Thomas (c.1535-1603). A Puritan leader of the time of Elizabeth. He was born in Hertfordshire, and studied divinity at Cambridge, being entered as sizar at Clare Hall in 1547, and elected to a scholarship at Saint John's College in 1550. Here he soon became an active defender of the new religious doctrines which were then in the ascendency at Cambridge and of which Saint John's was the stronghold. During Mary's reign he was forced to discontinue his studies at the university, and became clerk to a counselor-at-law. Returning to Cambridge after the accession of Elizabeth, he came under the influence of the Puritan theologian Dr. James Pilkington, then master of Saint John's, from which college he received a fellowship in 1560. Two years later the major fellowship in Trinity was conferred upon him. In 1564 he took part in a theological disputation before Queen Elizabeth, who, it is alleged, strongly favored his adversary. Five years later he became Lady Margaret professor of divinity; but in 1570 he was deprived of his professorship by Whitgift, then vice-chancellor, who was offended by Cartwright's attacks on the hierarchy and government of the Established Church. The next year he lost his fellowship in Trinity by command of the same officer, and then made a visit to Geneva, where he met Theodore Beza, who greatly admired his learning. He returned to England in 1572 during the excitement caused by the publication of the famous *Admonition to the Parliament*, written by two London clergymen, John Field and Thomas Wilcox. This book gave definiteness to the Puritan movement, presenting the Calvinistic system of Geneva as a model for reforms of the English Church. Cartwright gave aid and comfort to the authors, who were imprisoned, and defended the book in a second *Admonition to the Parliament*. To this Whitgift produced an *Answer*, which was followed by another paper by Cartwright, attacking the forms and ceremonies of the Church, such as the use of the ring in the marriage celebration and the cross in baptism. An indirect result of the controversy was the production of one of the most remarkable books of that fruitful age—Hooker's *Ecclesiastical Polity* (consult introduction to edition by Hanbury, London, 1830). In 1573 the Court of High Commission issued an order for Cartwright's arrest. Accordingly, he fled to the Continent, where for a time he preached before the English congregations in Antwerp and Middelburg. Returning without the Queen's consent in 1585, he was imprisoned in the Fleet without legal warrant by the bigoted Aylmer, Bishop of London; but he was presently set free. He was committed to the Fleet in 1590, and again in 1591, when he refused to take the infamous oath ex officio. From his liberation in 1592 until his death in 1603, he appears to have escaped persecution; but, as sometimes alleged, there is no evidence that he changed his views.

Consult: Isaac Maddox, *Vindication of the Government, Doctrine, and Worship of the Church of England Against Neal* (London, 1733); Hallam, *Constitutional History of England*, Vol. I. (new ed., London, 1876); Dexter, *Congregationalism* (New York, 1880); Mullinger, *History of the University of Cambridge*, Vol. II. (London, 1873-84); id., in *Dictionary of National Biography*, IX. (New York, 1887); Cooper, *Athenæ Cantab.*, Vol. II. (Cambridge, 1858-61); Strype, *Annals* (new ed., Oxford, 1824); id., *Life of Whitgift* (Oxford, 1822); and for the controversy over the *Admonition*, Whitgift, *Defense of the Answer*, in his *Works* (Cambridge, 1851-53), published by the Parker Society.

CARTWRIGHT, William (1611-43). An English poet and divine, born at Northway, near Tewkesbury. He graduated M.A. at Christ Church, Oxford (1635), took holy orders, became precentor of Salisbury Cathedral, and junior proctor of Oxford (1643), and died a few months later (November 29). Cartwright was much beloved by many friends, among whom was King Charles. He is a good example of a once large class of 'florid and seraphical preachers.' He wrote several plays, of which the *Ordinary*, ridiculing the Puritans, has considerable interest. His *Comedies, Tragi-Comedies with Other Poems* were collected by Moseley (London, 1651). Consult Ward, *English Poets*, Vol. II. (London, 1881).

CARUCATE, kăr′u̇-kȧt (Med. Lat. *carucatȧ*, from *caruca*, plow, Lat. *carruca*, carriage, from *carrus*, car), or Plowland. In the mediæval manor, the land which could be tilled in a year by one plow with its eight oxen. The carucate was used as a unit of measure, but varied in different localities from 120 to 180 acres. See Hide.

CARÚPANO, kȧ-rōō′pȧ-nō. A seaport of the State of Bermudez, Venezuela, situated on the north side of the peninsula of Paria (Map: Venezuela, E 1). The town manufactures straw hats, ropes, soap, brandy, sugar, and earthenware, and is, besides, an export centre for cotton, dyewoods, cacao, and coffee. It is the residence of a United States consular agent. Population, 10,000.

CARUS, kä′ru̧s, Julius Victor (1823-1903). A German zoölogist, born in Leipzig, August 25, 1823. He was custodian of the Museum of Comparative Anatomy at Oxford from 1849 to 1851. In 1853 he became professor of comparative anatomy at Leipzig, where subsequently he was made professor extraordinarius of zoölogy. His more important works are: *Zur nähern Kenntniss des Generationswechsels* (1849); *System der tierischen Morphologie* (1853); *Icones Zootomicæ* (1857). He also translated Darwin's works into German, and in 1878 became editor of the *Zoologischen Anzeiger*.

CARUS, Karl Gustav (1789-1869). A German physician and physiologist, born in Leipzig. He studied medicine at the university of his native city, and in 1814 was made professor of obstetrics at the Academy of Medicine and Surgery in Dresden. Following are the most important of his numerous publications: *Lehrbuch der Gynäkologie* (2 vols., 1820); *Erläuterungstafeln zur vergleichenden Anatomie* (1826-55); *Grundzüge der vergleichenden Anatomie und Physiologie* (3 vols., 1828); *System der Physiologie* (2d ed., 1847-49); *Erfahrungsresultate aus ärztlichen Studien und ärztlichem Wirken* (1859); *Ueber Lebensmagnetismus* (1857); *Lebenserinnerungen und Denkwürdigkeiten* (4 vols., 1865-66).

CA′RUS, Marcus Aurelius (?-283). Emperor of Rome from 282 to 283. Of Illyrian origin, he had held many civil and military positions when the Emperor Probus made him pretorian prefect in 282; and soon after, at the assassination of Probus, he was chosen Emperor by the legions. He at once made his sons, Carinus and Numerianus, *Cæsars.* He was successful in campaigns against the Sarmatians and the Parthians, but died near Ctesiphon in August, 283.

CARVAJAL, Francisco. See Carbajal.

CARVAJAL, kär′vä-häl′, Gaspar de (? -1584). A Spanish missionary, born in Estremadura. As a member of the Dominican Order he went as a missionary to Peru in 1533. When Gonzalo Pizarro organized his expedition to eastern Peru, Carvajal was selected as his chaplain. Afterwards he became sub-prior of the convent of San Rosario, Lima, but later devoted himself to the conversion of the Indians in Tucuman. He eventually obtained the supreme ecclesiastical jurisdiction in that territory and greatly encouraged missionary labor and the development of colonization. The establishment of many Indian and Spanish settlements is ascribed to his influence.

CARVAJAL, kär′vä-häl′, or **CARBAJAL**, kär′bä-häl′, Tomas José Gonzales (1753-1834). A Spanish poet and statesman. He was educated in Seville. He held a number of offices of importance, and in 1812 became director of the University of San Isidro, where, by establishing a chair of international law, he offended the Government, and was imprisoned for five years. He was reinstated by the Revolution of 1820, but forced into exile by the counter-revolution three years later. He died a member of the supreme council of war. Carvajal obtained celebrity as the author of metrical translations of the poetical books of the Bible, and for other works in prose and verse.

CARVALHO, kär-vä′lyō, José da Silva (1782-1845). A Portuguese statesman, borr in Castelbranco (Beira). From 1817 he was busily devising methods for the accomplishment of national freedom; was Minister of Justice under John VI., and was again and again proscribed. Having taken prominent part in the restoration of Dom Pedro, he was intrusted by that monarch with the portfolio of finance. On the occasion of the revolutionary reaction in favor of the Constitution of 1820, he was compelled to go into exile, but in 1842 returned, assisted in the reëstablishment of the Constitution of Dom Pedro, and was appointed a councilor of State.

CARVALHO, kär-vä′lyō, Marie Caroline Félix Miolan (1827-95). A French singer, born at Marseilles. She entered the Conservatory of Music in Paris, and took the first prize, 1847. Her début was made at the Opéra Comique, where her voice, though small, had all the wonderful phrasing that afterwards made her one of the greatest singers of her time. In 1856 she married M. Carvalho, who took the direction of the Théâtre Lyrique, and there she sustained a number of rôles, particularly Cherubino in *Le Mariage de Figaro*, Zerlina in *Don Juan*, Juliette, and Marguerite. In 1885 she left the stage.

CARVEL-BUILT. See Boat.

CAR′VER, John (c.1575-1621). A leader of the Pilgrim Fathers, and the first Governor of Plymouth Colony. He was born in England, probably in Nottinghamshire, but with others removed to Holland in 1607 or 1608, on account of religious persecution, and in 1617 was sent by his companions, with Robert Cushman, to make arrangements with the Virginia Company for the establishment of a colony in America. A patent was finally secured by Bradford and Cushman, in 1619, and with 100 other colonists Carver set sail from Plymouth on September 6 of the following year. When the famous Compact of Government was drawn up in the Cape Cod Bay, Carver, who had probably already acted as Governor under the provisions of the charter for the calendar year about to close, was confirmed in this position, and during the hardships and privations of the next few months did much to encourage his associates and to promote the success of the Colony. On March 23, 1821, he was elected Governor of Plymouth for a second term, but died of a sunstroke in the following month.

CARVER, Jonathan (1732-80). An American traveler. He was born in Stillwater, Conn., studied medicine for a time, served in the Colonial army throughout the French and Indian War, and after the conclusion of peace in 1763 resolved to explore the territory beyond the Mississippi acquired by Great Britain from France, and to proceed, if possible, as far as the Pacific Ocean. He started from Boston in June, 1766, proceeded to Michilimackinac, 1300 miles away, arranged with the Governor there to furnish him at an early date with needed supplies at the Falls of Saint Anthony, and then passed westward along the Fox and Wisconsin rivers to the Mississippi, but the promised supplies not having been sent to the Falls of Saint Anthony, he spent some time with the "Naudowessies of the Plains" (Sioux), explored much of the territory in the present State of Minnesota, and in October, 1768, again reached Boston, after having traveled fully 7000 miles, visited twelve nations of Indians, and made many geographical discoveries of considerable value. He went to England in 1769 to publish his journal, but failed to secure the expected assistance from the Government, and having spent his whole fortune to further his explorations, was forced to earn a livelihood as a hack-writer. Finally, in 1778, the first edition of his book appeared under the title, *Three Years' Travels Throughout the Interior Parts of North America.* It had a wide sale, a number of editions were published, and translations were eventually made into French and German. "As a contribution to the history of inland discovery upon this continent," says Tyler, "and especially to our materials for true and precise information concerning the manners, customs, religion, and language of the Indians, Carver's book of *Travels* is of unsurpassed value. Besides its worth for instruction is its worth for delight; we have no other Indian book more captivating than this." Carver also wrote a pamphlet, *A Treatise on the Culture of the Tobacco Plant Adapted to Northern Climates and Designed for the Use of the Landholders of Great Britain* (1799), and published under his name a crude compilation, entitled *The New Universal Traveler*. Consult sketches of Carver in Tyler, *The Literary History of the American Revolution* (New York, 1897); and in *The Carver Centenary* (1867), published by the Minnesota Historical Society.

CARVING (OE. *kervinge*, from *kerven*, to carve, AS. *ceorfan*, Icel. *kyrfa*, Ger. *kerben*, ultimately connected with Gk. *γράφειν*, *graphein*, to write, originally to cut). A subordinate branch of sculpture, usually performed on ivory or wood. Ivory was the favorite material for this purpose in the East from an early period. Among the Babylonians, who likewise practiced gem-engraving to a great extent, carved heads for staves were executed in vast quantities, as every Babylonian carried a staff and a signet ring. At a later period ivory was chiefly employed in small works, usually of a decorative character. During the earliest period statues of the gods were generally of wood, painted, gilt, or draped with colored robes, different kinds of wood being appropriated to different divinities. (See ACROLITHS; CHASING; CHRYSELEPHANTINE, etc.) Carvings in ivory form an important branch of early Christian sculpture. Among the most curious of these are the ivory tablets adorned on the outside with low-reliefs, and on the inside coated with wax for the purpose of receiving writing. The chair inlaid with ivory that belonged to Archbishop Maximinus in the cathedral at Ravenna, is of this period (546-555). In 803 Charlemagne received two richly carved doors as a present from Constantinople, but works of the same kind were executed much earlier. (See IVORY CARVING.) Toward the end of the Middle Ages the art of carving in wood was brought to a high degree of perfection in Germany. (See WOOD CARVING.) The art here took on a very realistic form. Carved shrines were deepened in order to give room for the arrangement of the scene in various planes. The foreground figures were frequently in entire relief standing out as statuettes, the others on a receding plane being in high relief, while the background objects were in low relief. Landscape backgrounds often figured in these scenes, and an additional touch of realism was given them by coloring and modeling the costumes after the gay fashion of the day. So florid did this style become that it even affected the more serious plastic art of the time, and its influence is felt in some of the sculpture of the present, or of very recent times. The elaboration of these carved works reached to their architectural setting until the naturalistic tendency became so marked as to develop curling flourishes of leaves and tendrils in the framework. Suabia is particularly rich in early altarpieces of this kind. Many of the Belgian churches also possess very beautiful examples of wood-carving. Michael Wohlgemuth of Nuremberg, and after him Veit Stoss, were eminent carvers in wood. The wood-carving on the great altar of the cathedral at Schleswig by Hans Brüggemann belongs to the beginning of the Sixteenth Century. Many graceful specimens of wood-carving, on a smaller scale, belonging to this period, are to be seen in museums. Nuremberg was celebrated for its wood-carvings; but only a few of the many works ascribed to him can be assigned with certainty to Albert Dürer. Portrait medallions, usually cut in box, were much in vogue during the early part of the Sixteenth Century. The first artist in this line was Hans Schwartz of Augsburg. During the Seventeenth and Eighteenth centuries we find ivory again extensively employed in crucifixes, crosses, and goblets, with relief representations.

CA'RY, ALICE (1820-71) and PHŒBE (1824-71). Two American poets, born near Cincinnati, Ohio. After miscellaneous contributions to the daily press, they gained their first success by *Poems of Alice and Phœbe Cary* (1850). In 1851 Alice issued *The Clovernook Papers* (second series, 1853); *Clovernook Children* (1854); tales of Western Life. In 1850 the sisters moved to New York, where Alice published *Lyra, and Other Poems* (1853, enlarged 1855); *Lyrics and Other Hymns* (1866); *The Lover's Diary* (1867); *Snow Berries*, a book for young folks (1869); and also *Hagar: A Story of To-Day* (1852); *Married, Not Mated* (1856); *Pictures of Country Life* (1857); and *The Bishop's Son* (1857). All these are excellent in domestic description. Phœbe published *Poems and Parodies* (1854); *Poems of Faith, Hope, and Love* (1868); with numerous hymns (chiefly in *Hymns For All Christians*, edited by C. F. Deems, 1869), and occasional pieces. Her best-known hymn is "Nearer Home." Under the friendship and patronage of Horace Greeley the sisters achieved literary and social success in New York, and maintained it for nearly two decades. Neither was ever married. Phœbe was especially noted for her wit. They died within three months of each other, Alice in New York and Phœbe in Newport, R. I. A collected edition of their poems appeared posthumously. Consult Mary C. Ames, *Memorial of Alice and Phœbe Cary* (New York, 1873).

CARY, ANNIE LOUISE (1842—). An American contralto, born in Wayne, Maine. After having studied in Milan with Giovanni Corsi (1866-68), she appeared in Italian opera in Copenhagen. Afterwards she received instruction from Viardot-Garcia in Baden-Baden, and sang with great success in Stockholm, Paris, Brussels, and London. She made her début in New York in 1870, singing with Nilsson, Brignoli, and Vieuxtemps. Her success with the public was instantaneous, and for a dozen years she was the favorite singer in the United States. She created, in New York, the part of Amneris in *Aïda* (1873), and in the opinion of many critics the impersonation has remained unmatched. Her tours in Russia in 1875-77 were a series of continuous triumphs. In 1882 she married Charles M. Raymond, of Brooklyn, and retired from public life, only occasionally singing for charity or in the parish church.

CARY, ARCHIBALD (c.1730-86). An American patriot, born in Virginia. He was a member for several years of the House of Burgesses, where he was conspicuous as an opponent of the arbitrary measures of the British Ministry. He was a member of the Committee of Correspondence in 1773, and in 1776, as a delegate to the famous Virginia Convention, introduced the resolutions by which the Virginia delegates in the Continental Congress were instructed to propose a declaration of independence. He was president of the Virginia Senate from the organization of the State Government until his death.

CARY, George Lovell (1830—). An American theologian, born at Medway, Mass. He was educated at Harvard and at Allegheny College, and was professor at Antioch College, Ohio, from 1852 to 1862, when he was appointed to the chair of New Testament literature at Meadville Theological School. His works include: *Introduction to the Greek of the New Testament* (1879; 2d ed. 1881); *The Synoptic Gospels, with a Chapter on the Text-Criticism of the New Testament* (1900); and the volume on *Matthew, Mark, and Luke*, in the *International Handbooks to the New Testament*.

CARY, Henry Francis (1772-1844). An English writer and clergyman, known for his admirable translation of Dante. He was born at Gibraltar, studied at Christ Church, Oxford, and became a clergyman of the Church of England. From 1826 to 1837 he was assistant keeper of printed books in the British Museum. In 1805 he translated Dante's *Inferno*, and in 1814 the whole of the *Divina Commedia*, his translation being remarkable not only for its accuracy, but for its expressiveness and force. He afterwards translated Pindar's *Odes* and Aristophanes's *Birds*, and wrote a series of memoirs, in continuation of Dr. Johnson's *Lives of the Poets*. He was an intimate friend of Coleridge and Charles Lamb. Consult the *Memoir* by his son, Henry Cary (London, 1847).

CARY, Lucius. See Falkland, second Viscount.

CA'RYA. See Hickory.

CARYATIDES, kăr'ĭ-ăt'ĭ-dēz (Lat., Gk. Καρυᾶτις, *Karyatis*, woman of Caryæ). A name given to female figures, in Greek architecture, when applied instead of columns to support a roof. The account of the origin of the name given by the Roman architect Vitruvius is, that the inhabitants of Caryæ, a city in Laconia, having joined the Persians, the Greeks, after their victory over the Persians, destroyed the town, slew the men, and carried the women into captivity. As a token of triumph, figures of these women and of the conquered Persians were introduced as supports in architecture. This story is a pure invention. Such figures are found in Egypt and Greece from early times as supports of thrones or lustral vases, and were used in Greek architecture during the Sixth Century B.C., as is proved by the discovery of such figures used as columns for the treasuries of the Cnidians and the Siphnians at Delphi. The female figures are always calm and dignified, in no way oppressed by the weight they sustain, and seem to be conceived originally as ministrants of the deities within. The Greek word means not only a woman of Caryæ, but also a dancer in the peculiar dance with which the Laconian maidens honored Artemis Caryatis. The name ought properly to denote only a certain kind of supporting figure, in which one hand is raised to help sustain the weight; others would be called Canephori, or Calathephori. The term, however, has been extended to all such figures, though in Greek they are properly called only 'Maidens.' The most celebrated are the figures which support the southwest porch of the Erechtheum in Athens. Male figures used for the same purpose are called Atlantes (q.v.), and in these the idea of suffering under a heavy burden is clearly expressed. See Homolle, in *Bulletin de Corréspondance hellénique*, Vols. XXIII. and XXIV. (Paris, 1899). For illustration, see Erechtheum.

CARYL, kăr'ĭl, Joseph (1602-73). An English Nonconformist clergyman during the revolutionary period. He was educated at Oxford, became preacher at Lincoln's Inn, and in 1643 was appointed a member of the Westminster Assembly of Divines. He was a moderate independent, but zealous for the Covenant. By order of Cromwell, he attended Charles I. in Holmby House, and in 1650 he was sent with Dr. John Owen to accompany Cromwell to Scotland. His chief published work was a ponderous commentary on the book of Job, in which, after the fashion of his time, he enlarged on every verse, and almost on every word.

CARY'OCAR (Neo-Lat., from Gk. κάρυον, *karyon*, nut + κάρα, *kara*, head). A genus of a dozen species of large trees of the order Caryocaraceæ, or, according to Bentham and Hooker, the order Ternstrœmiaceæ, and almost constituting the whole order. They are all natives of Guiana and Brazil, and are sometimes called pekea-trees. They yield good timber for shipbuilding, and produce the delicious nuts occasionally met with in markets, called *butternuts* or *souari-nuts*. The food is a sort of drupe, containing several nuts. The fleshy part of the drupe consists of a butter-like substance, which melts between the fingers, and is used in cookery instead of butter, on which account these trees are sometimes called butter-trees. It forms merely a thin covering for the nuts. The kernels are remarkably soft. An oil is extracted from them which is scarcely inferior to olive oil. *Caryocar nuciferum* is now cultivated in the island of Saint Vincent; *Caryocar butyrosum*, *Caryocar glabrum*, *Caryocar tomentosum*, and other species appear equally worthy of attention.

CAR'YOKINE'SIS. See Karyokinesis.

CAR'YOPHYLLA'CEÆ (Neo-Lat. nom. pl., from *Caryophyllus*, from Gk. κάρυον, *karyon*, nut + φύλλον, *phyllon*, leaf). An order of dicotyledonous plants, containing about 60 genera and 1300 species, mostly herbaceous plants, a few half shrubby. The stems are often tumid at the articulations; the leaves always opposite and entire, often uniting around the stem. The flowers are regular; the calyx persistent, of 4 to 5 sepals, either free or united into a tube; the corolla of 4 to 5 petals, which are frequently bifid, and generally terminate in a claw at the base, sometimes wanting; the stamens as many, or twice as many, as the petals; the ovary of 2 to 5 carpels; the styles are stigmatic along the inside; the fruit is a one-celled capsule, with central placenta, to which the seeds are attached. The plants of this order are mostly natives of temperate and cold countries; some of them are only found on mountains, near the limits of perpetual snow. Some of them are inconspicuous weeds, some showy flowers; almost all are insipid and inert; a few contain saponine, and afford a substitute for soap. (See Soapwort.) To this order belong the pink, carnation, sweet-william, lychnis, and chickweed (qq.v.).

This order very naturally divides into two distinct groups which differ biologically and morphologically, the Silenoideæ and Alsinoideæ. In the first the flowers are gamosepalous, in the other they have distinct sepals, and the stamens are often perigynous. The chief genera of the first group are Silene, Lychnis, Gypsophila, and Dianthus, while of the second Stellaria, Cerastium, Arenaria, Spergula, Paronychia, and Scleranthus are the best known.

CAR'YOP'SIS (Neo-Lat., Fr. *caryopse*, from Gk. κάρυον, *karyon*, nut + ὄψις, *opsis*, appearance). The peculiar, seed-like fruit of grasses, as corn, wheat, etc., often called a 'grain.' See FRUIT.

CAR'YO'TA (Neo-Lat. nom. pl., from Gk. καρυωτός, *karyōtos*, nut-like, from κάρυον, *karyon*, nut). A genus of palms, natives of the East Indies. One species (*Caryota urens*) is remarkable for the acridity of its fruit, which produces a burning sensation when its pulp is applied to the skin. It is also highly valuable for the great quantity of juice which flows from the wounded spathes in the hot season, sometimes amounting to 100 pints in 24 hours from a single tree. Sugar (*jaggery*) is made from this juice by boiling it down, and on this account this palm is sometimes called the jaggery-palm. Wine or toddy is also made by the fermentation of the juice. The trunks yield starch which is much used for food, and is said to be equal to the best sago. The outer part of the stem, which is very hard, is applicable to many purposes. The fibres of the leafstalks are made into ropes, which are very strong and durable; the leafstalks, merely stripped of the leaflets, are used as fishing-rods, being light, tapering, and elastic; and the woolly substance found at their base is sometimes used for calking ships. This palm is found in India and Ceylon, and abounds chiefly in mountainous districts. It rises to a height of 60 feet, with a trunk one foot in diameter and a magnificent spreading head of great, double-pinnate leaves and triangular leaflets, the apex of the triangle being their point of attachment. From this character of the leaflets the name fishtail palm has been given it.

CA'RYSFORT' REEF. A dangerous coral reef off the southeast coast of Florida, in latitude 25° 13′ N., longitude 80° 13′ W., lying about 5 miles east of Key Largo (Map: Florida, D 4). It has a lighthouse 112 feet high, with a flashing red and white light of the first order. It stands 106 feet above the sea.

CASA, kä'sȧ (from Lat. *casa*, cottage). The prefix to many names in Italian and Spanish, signifying house or home.

CASA, kä'sȧ, GIOVANNI DELLA (1503-56). An Italian prelate and poet, sometimes called the Chesterfield of Italy, from his principal prose work, the *Galateo*, a sort of manual of polite conduct. The descendant of an old Florentine family, he studied in Bologna, Padua, and Rome, where he led a gay and dissipated life, until he took orders in 1534. He found a warm friend and patron in Cardinal Alessandro Farnese, who later, as Paul III., appointed him successively apostolic envoy to Florence, Archbishop of Benevento, and Papal Nuncio to Venice. Under Paul IV. he became Secretary of State, and in 1555 had hopes of being made a cardinal; but lost his opportunity, as some believe, through the licentiousness of certain poems, notably his *Capitoli del forno*. Della Casa was a prolific writer, in both Latin and Italian. His works include a *Life of Pietro Bembo;* translations from Thucydides; the much-praised *Galateo* (1558; new ed. 1882); and many poems, which are distinguished by a strength and polish rarely found among his contemporaries. He exerted a marked influence upon the poets of the following generation, notably upon Tasso, who was an admirer and close student of his verse. For his life, consult Casotti, in *Opere* (Florence, 1707; republished, with additions, Venice, 1728 and 1752, and Milan, 1806).

CASABIANCA, kä'zȧ-byäṉ'kȧ, LOUIS (1755-98). A French naval officer. He was born at Bastia, Corsica, and with the Comte de Grasse took part in the American Revolution. He was a member of the National Convention, and later one of the Council of Five Hundred, in which assembly he occupied himself with the organization of the French Navy. As captain he commanded the *Orient*, the flagship of the fleet which transported Napoleon and his army to Egypt. In the battle of Abukir, when the fleet was attacked by the English, Admiral Brueys was killed, and Casabianca had command of the fleet. Even when he was wounded and the ship caught fire he remained at his post. His ten-year-old son refused to leave his father, and both were killed by the blowing up of the ship. The story forms the theme of Mrs. Hemans's famous poem.

CASABLANCA, kä'sȧ-bläṉ'kȧ. See DAR-EL-BEIDA.

CASA BRACCIO, kä'sȧ brä'chō. A novel of Italian life, by Francis Marion Crawford (1895).

CASA D'ORO, dō'rō, or **CA' D'ORO**. A palace in Venice dating from the Fourteenth Century, noted for its elegance. The façade, unsymmetrically divided in two vertical sections, is inlaid with marbles of various colors, and pierced by arches differing in size and arrangement, which are separated in the right division by paneling, and in the left by arcades.

CASA GRANDE, grän'dȧ (Sp., great house). A ruined structure of prehistoric origin in the valley of the Gila River, near Florence, Arizona, about 15 miles southeast of Casa Grande station (named from the ruin) on the Southern Pacific Railway. It may have been seen by white men connected with the Coronado Expedition in 1540; it was certainly discovered by Padre Kino in 1694, and was revisited by him in 1697, when he held a service within it, though it had been unoccupied during the period covered by tradition. It was again visited in 1775 by Padre Font, but remained little known until rediscovered by American emigrants about 1849; it was well described by John Russell Bartlett in 1854. In 1889, on the petition of citizens chiefly resident in Massachusetts, Congress provided for the protection of the ruin as a monument of antiquity; and in 1892 the structure and the adjacent grounds, bearing less imposing ruins, were set apart as a public reservation in care of a custodian. The structure as it stood about 1895 is shown in the plate. It is of cajon or pisé construction (see ARCHÆOLOGY, AMERICAN), in walls 3 to 5 feet thick at the ground, thinning upward; the surfaces were plastered, especially within, with a slip of adobe clay. There are five rooms in the ground plan; portions of three stories remain, and there may have been a fourth in part of the structure. The ruin is not unlike several in Mexico and Central America, but is the only one of its type in the United States. It was unquestionably erected by an Amerind people of Pueblo affiliations, probably the ancestors of the present Pima tribe. It was described by Mindeleff (Bureau of American Ethnology, 13th *Report*, 1896) and later by McGee (ib., 15th *Report*, 1897). It is not to be confounded with the still more extensive but less-known ruin of Casas Grandes in the State of Chihuahua, Mexico.

CASA GUIDI (kä′sȧ gwē′dė) **WINDOWS.** A poem in two parts by Elizabeth Barrett Browning (1851), the passionate voicings of her intense hopes for Italian liberty.

CASAL, kȧ-säl′, or **CAZAL**, Manuel Ayres de (1754-1840). A Brazilian geographer and historian. He was born in Portugal, where he was ordained to the priesthood. Afterwards he settled in the Province of Goyaz, Brazil, and traveled extensively through the country, collecting the information compiled in the valuable work entitled *Corografica brazilica, ou relação historico-geografico do reino do Brazil* (1817; 2d ed. 1845). This work, prepared under the auspices of King John VI., is distinguished by its exactitude, and is the first circumstantial report on the interior provinces of South America.

CASALE, kȧ-sä′lȧ. A fortified city of Piedmont, Italy, in the Province of Alessandria, the ancient capital of the Duchy of Montferrate, on the right bank of the Po, 48 miles east of Turin (Map: Italy, C 2). It has a theatre, several palaces, a gymnasium, a technical institute, a seminary, and nine churches, among them the Romanesque cathedral founded in 741 by the Lombard King Liutprand, and rebuilt about the beginning of the Twelfth Century, containing paintings and statues by Ferrari and other masters, and having a vaulted basilica with double aisles. The old citadel, founded before 1500, was one of the strongest in Italy, and within recent years the fortifications have been greatly strengthened and extended. Casale is a centre of local trade, the chief industries being the culture and manufacture of silk, and the making of chalk cement, machines, tools, liqueurs, and fertilizers. The town is the seat of a bishop. Population (commune), in 1881, 29,000; in 1901, 31,793, of whom about two-thirds reside in the city.

Casale is on the site of the Roman Bodincomagus. It was founded by Liutprand, in 730, destroyed by the Lombard cities in 1215, came into the possession of the Marquises of Montferrate in the Thirteenth Century, and in the Sixteenth Century, after being captured by the Spaniards, it fell to the House of Savoy, was sold in 1681 to France, was conquered in 1695 by the Allies, was recovered by Louis XIV., and restored to Savoy in 1703.

CASALMAGGIORE, kȧ-säl′mȧ-jō′rȧ. A city in northern Italy, 15 miles north of Parma, on the left bank of the Po, from whose frequent inundations it is protected by embankments (Map: Italy, E 3). It has large and beautiful churches, a theatre, a gymnasium, and a public library. It manufactures pottery, glass, leather, and chemicals, and markets the wine of the surrounding country. Population, of the town, about 4000; of the commune (1901), 16,400.

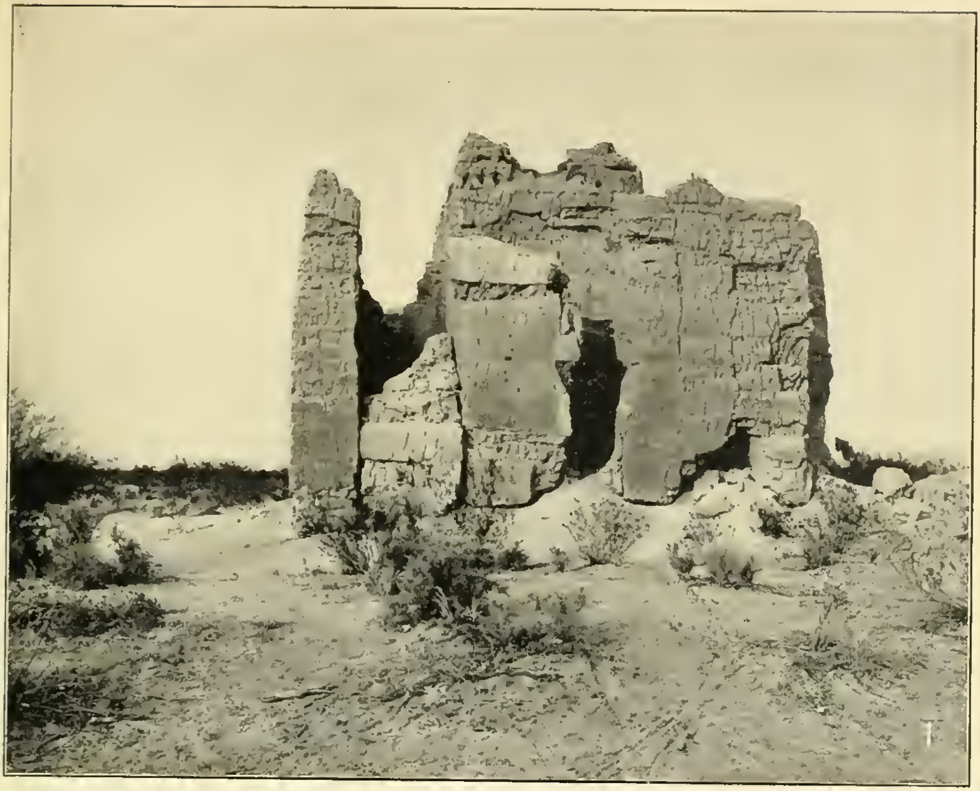
CASAMICCIOLA, kä′sȧ-mē′chō-lȧ. A watering-place of Italy, noted for its alkaline-saline springs, its sand and sea baths, situated on the island of Ischia, and belonging to the Province of Naples (Map: Italy, B 11). During the earthquakes of 1881 and 1883 the place was almost completely destroyed, and even at present, although the Government has aided in its rebuilding, a considerable part of the town is in ruins. Population (commune), in 1901, 3731.

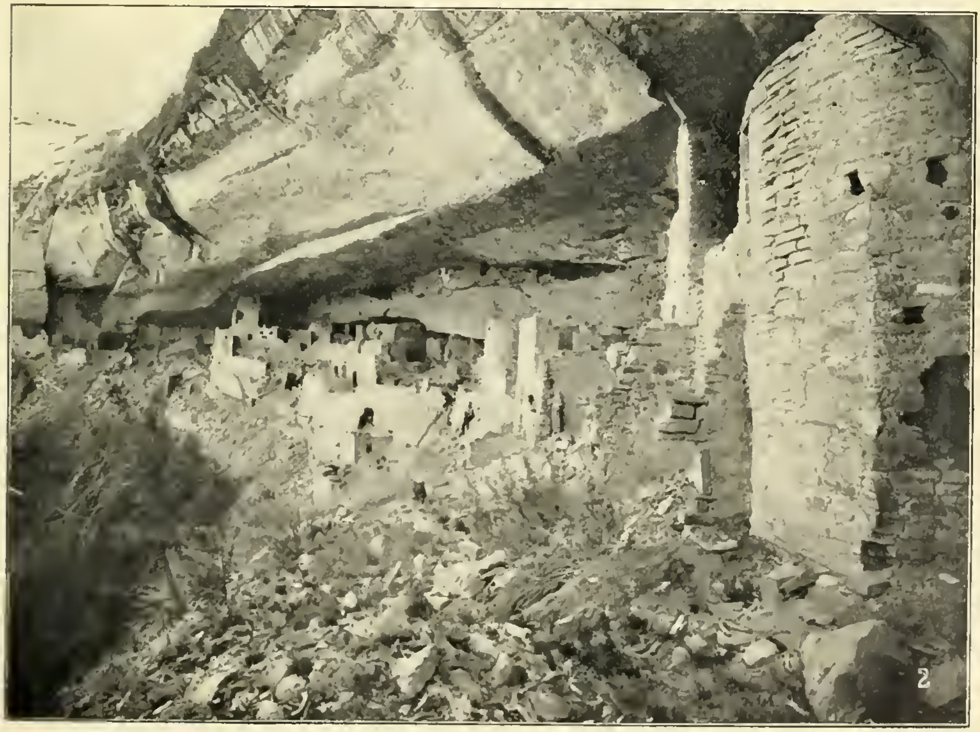
CASANOVA, kä′sȧ-nō′vȧ, Francesco (1730-1805). An Italian painter, brother of Giovanni Jacopo. He was born in London, the son of Venetian parents. He was instructed in art by Francesco Guardi, and later studied and copied the works of Wonverman, in Dresden. He painted landscapes and animal subjects, but was chiefly devoted to battle pieces, the work, principally, of his imagination. He went to Vienna, and painted for the Empress Catharine of Russia a picture of her victory over the Turks. His drawing was often faulty, but there was a play and movement to his scenes that commanded attention. He was made a member of the French Academy, and two of his large battle pieces are in the Louvre. He died near Vienna in 1805.

CASANOVA, Giovanni Baptista (1722-95). An Italian painter, born in Venice; brother of Giovanni Jacopo Casanova. He studied in Dresden as a pupil of de Sylvestre and Dietrich, and in Venice with Piazetta. After residence in Rome, he returned to Dresden in 1764 to accept the post of director of the Academy. He was an instructor of Winckelmann and Angelica Kauffmann.

CASANOVA DE SEINGALT, kä′sȧ-nō′vȧ de sän′gäl′, Giovanni Jacopo (1725-1803?). An Italian adventurer, born in Venice. His father, an actor, came of a noble family; his mother was the beautiful daughter of a shoemaker. He was brought up by his grandmother, and educated for the priesthood. Expelled in disgrace from the Seminary of Saint Cyprian, he was for a brief time attached to the household of Cardinal Acquaviva, entered the Venetian military service, and began a career of intrigue and adventure of which he has given us a frank and very well written account in his *Memoirs* (12 vols., Leipzig, 1828-38, often reprinted). His adventurous wanderings led him to almost every Court of Europe, even to Constantinople and Saint Petersburg. Journalist, preacher, card-sharper, mesmerist, abbé, doctor, diplomatist, he was always a charlatan, always a rake, and nearly always a scoundrel. Yet he entered often into high circles, and was presented to Empress Catharine of Russia. In 1755 he returned to Venice, was promptly arrested as a spy, and imprisoned in the Piombi, afterwards made notorious by Silvio Pellico. The story of his escape (October 31, 1756) is the most graphic portion of his *Memoirs*, and also the most decent. Published separately, it gained him celebrity and made him the fashion. He now began a new career of dissolute adventure. Handsome, witty, and affable, he obtained interviews with Louis XV. and Frederick the Great, with Rousseau and Voltaire. In Madame de Pompadour he found a kindred spirit, Italian princes honored him, and the Holy Father recognized his virtues by a decoration. All efforts to reinstate himself in the favor of the Venetians, such as his refutation of

AMERICAN PREHISTORIC DWELLINGS





1. CASA GRANDE.

2. CLIFF DWELLINGS IN THE MESA VERDE.

Amelot de la Houssaye's attack on the Constitution of that Republic, failed, and as he became known his real character was recognized even in Madrid and Paris. In his fifty-seventh year (1782) he accepted the post of librarian to Count Waldstein at Dux, in Bohemia. Here he spent his declining years, living over again with delight the exploits of his godless life. These he decked out with an outrageous frankness and many pious professions in his *Memoirs*, which are a faithful picture of Venetian manners and morals in their worst estate, drawn with what Janin calls "a marvelous instinct for vice and corruption."

CAS'AREEP, or **CASSAREEP** (South American word). A sauce or condiment made from the juice of the bitter cassava, or manioc-root. It is in the highest esteem in Guiana, where it is employed to flavor almost every dish, and it is the basis of the favorite West Indian dish called *pepper-pot*. It is a powerful antiseptic, and meat can by means of it be kept for a long time quite fresh, even in a tropical climate. It is made by evaporating and concentrating the juice, which is also mixed with various aromatics. The poisonous principle of the juice is dissipated in the evaporation, so that although the juice in a fresh state is readily fatal to life, casareep is perfectly safe and wholesome. Casareep is imported into Holland and Britain, and remains unimpaired in quality for several years.

CASAREGIS, kä'sȧ-rā'jēs, GIUSEPPE MARIA LORENZO (1670-1737). An Italian jurist, born in Genoa. He studied law at Pisa, and was an auditor of the Rota (q.v.) at Siena and Florence. He was an authority in commercial law, and was one of the founders of the literature on that subject. His principal work is *Discursus legales de commercio* (2 vols., 1707; Vol. III., 1729).

CASAS GRANDES, kä'sȧs grän'dās (Sp., great houses). A village in Chihuahua, Mexico, 150 miles northwest of the city of Chihuahua, celebrated for the ruins of early Mexican buildings (Map: Mexico, E 2). In the vicinity are artificial mounds from which have been excavated stone axes and various other prehistoric utensils. Similar ruins are found near the Gila, the Salinas, and the Colorado rivers.

CASAS, LAS. See LAS CASAS.

CASATI, kȧ-sä'tē, GAETANO (1838-1902). An African explorer, born at Lesmo in Upper Italy. After studying at the Academy in Pavia he entered the Italian Army in 1859 and served there till 1879. On December 24th of that year he sailed for Africa under commission from the Società d'Esplorazione Commerciale d'Africa. Upon landing he immediately took up his explorations, following the course of the Welle River and exploring the basin of the Bahr-el-Ghazal. In 1882 he was held prisoner for some time by a native chief: the following year he joined Emin Pasha and was shut in with him by the Mahdi insurrection. After their release he became 'resident' for Emin Pasha in the kingdom of Kabba Rega. Although that monarch was at first friendly, he subsequently seized Casati and condemned him to death; the explorer, however, escaped to Lake Albert Nyanza, where Emin Pasha rescued him in 1888. On December 6, 1889, Casati reached Zanzibar. Besides Reports, he has published *Dieci anni in Equatoria e ritorno con Emin Pascha* (2 vols., 1891).

CASAU'BON, REV. EDWARD. A character in George Eliot's *Middlemarch*. He is a dreamer whose supposed intellectual qualities so appeal to the heroine of the story that she accepts him as a husband. He soon proves himself to be not the lofty idealist she had imagined, but merely a self-centred pedant. See BROOKE, DOROTHEA.

CASAU'BON, *Fr. pron.* kȧ'zō'bôɴ', ISAAC (1559-1614). A distinguished French classicist and theologian, who with Joseph Scaliger (q.v.) and Justus Lipsius (q.v.) formed the famous triumvirate of Sixteenth Century classical scholars. Casaubon was born in Geneva, February 18, 1559. At the age of 23 he was appointed professor of Greek in his native town at a salary of £10 a year; in 1596 he was called to a similar position in Montpellier, and two years later was summoned to Paris by Henry IV. The influence of the Catholic opponents of Casaubon was strong enough, however, to prevent his receiving a professorship, and instead he was appointed royal librarian. After the murder of the King, he felt his position insecure, and in 1616 crossed to England, where James I. received him with favor, appointing him prebendary of Canterbury and Westminster. Casaubou was sharply attacked by his opponents because of the favor the English King showed him, and he was charged with having bartered his opinions for position. He died in Westminster July 1, 1614, and was buried in the great Abbey. Throughout his entire life Casaubou was interested in theological studies, but his fame rests primarily on his classical scholarship. He was possessed of great industry, an excellent critical and grammatical sense, and skill in illustration and exposition. He was the first to treat in systematic manner an important field of literary history. This he did in his masterly work, *De Satirica Græca Poesi et Romanorum Satira* (1605, last edition by Rambach, Halle, 1774). Most of his labor was expended on the preparation of editions and commentaries. The most important of these were on Strabo (1587); Theophrastus's *Characteres* (1592); Suetonius (1595); Persius (1605, 4th ed., 1833, called by Scaliger 'a divine book'); Polybius (1609); Polyænus, the editio princeps (1589); and especially Athenæus (1598), on the commentary of which he spent ten years. Besides these, he edited Apuleius; Aristotle; Aristophanes; the *Historiæ Augustæ Scriptores*; Pliny the Younger, etc.; he also made important contributions to the criticism and intrepretation of Dionysius of Halicarnassus; Diogenes; Laërtius; Theocritus, etc. His theological interests gave rise to the works *De Libertate Ecclesiastica* (1607) and *Exercitationes Contra Baronium* (1614), in which he attacked the *Annales Ecclesiastici* of Cardinal Baronius (q.v.). All these works would naturally appeal only to the scholar, but his characteristic diary, *Ephemerides*, may be relished by the general reader. It was edited by Russell (Oxford, 1850). Casaubon's *Letters* were published in Rotterdam, 1709.

The scholar lived on in his son, MÉRIC CASAUBON (1599-1671), born in Geneva and educated at Sedan and Oxford, who edited the works of Marcus Aurelius, Terence, Epictetus, etc. Made successively prebendary of Canterbury, vicar of two charges, a rector, he suffered because of his devotion to Charles I. At the Restoration, however, he again was in favor. He wrote *De Enthusiasmo;* but perhaps his greatest work was the pious preservation of his father's MSS. He died at Oxford, where he had taught theology, and, at the instance of Charles I., had received the degree of Doctor of Divinity. Consult: Pattison, *Isaac Casaubon*, 2d ed. by Nettleship (Oxford, 1892): and Nazelle, *Isaac Casaubon, sa vie et son temps* (Paris, 1897).

CASAULT, kȧ'zō', Sir LOUIS NAPOLEON (1822—). A Canadian jurist, born at Saint Thomas. He was admitted to the bar in 1847, and from 1854 to 1858 was a member, for Montmagny, of the Canadian Legislative Assembly. From 1867 to 1870 he represented Bellechasse in the Canadian House of Commons. He was professor of commercial and maritime law in Laval University from 1858 to 1891, and puisne judge of the Superior Court of Quebec in 1870-91. In 1891 he became Assistant Chief Justice of the court, and in 1894 Chief Justice. He was one of the three commissioners appointed to adjust accounts between Ontario and Quebec, and between those provinces and the Dominion.

CASBIN, kȧz-bēn'. See KASBIN.

CAS'CA, PUBLIUS SERVILIUS. The one among the assassins of Julius Cæsar who, according to Plutarch, struck the first blow. This was done across the back of Cæsar's neck with a short sword, but the wound was not deadly, and the finishing of the work was left to Brutus and the others.

CASCADE. See WATERFALL.

CASCADE RANGE. A range of mountains in the western United States and Canada forming a northward continuation of the Sierra Nevada Range (Map: Washington, C 6). It begins in Northern California near the Oregon boundary and extends across the latter State and Washington into British Columbia, where the line of elevations is continued by many small groups which are deeply intersected and eroded by river and lake systems. Its direction in the United States is nearly north and south, parallel to the Pacific Coast: in Oregon the main axis of elevations lies about 100 miles from the coast, while in Washington the distance increases to 150 miles. The limits of the Cascade Range in British Columbia are not clearly defined. The name, however, is commonly assigned to the entire plateau region stretching across the province from southeast to northwest, which is limited on the east by the lofty ranges of the Rocky Mountains, and on the west by the Island Range. The southern section of the range is crossed by the Columbia River and by the Klamath River, both of which have cut deep gorges. In British Columbia the Fraser River occupies an extensive cañon, where it passes across the range to discharge into the Strait of Georgia.

The Cascade Range in its southern section is marked by extreme ruggedness of outline and by some of the loftiest summits in the United States. In the Shasta group of California, which defines its limit to the south, are Mount Shasta, 14,510 feet, and several other peaks over 10,000 feet in height. In Oregon, it includes Mount Hood, 11,934 feet; Mount Jefferson, 10,200 feet; and Mount Pitt, 9760 feet; while in Washington is the magnificent cone of Mount Rainier (Mount Tacoma), 14,526 feet, with many peaks of lesser altitude, including Mount Baker, 10,500; Mount Saint Helens, 9750; and Mount Adams, 9570 feet. The British Columbian section contains no notable elevations, its character being rather that of a plateau dissected by numerous rivers, with a few prominences rising above the surface to altitudes of 6000 or 7000 feet. The loftier summits of the Cascade Range are extinct volcanoes, and carry heavy snow-fields and glaciers. Igneous and volcanic rocks with Paleozoic strata constitute the central mass, while later sediments form the flanks. Its slopes, in part forested with firs, pine, and hard wood, are drained by the Columbia, Klamath, and Fraser rivers and by a large number of smaller streams, all of which discharge finally into the Pacific Ocean. See topography of OREGON, WASHINGTON, and BRITISH COLUMBIA.

CASCARA, kȧs'kȧ-rȧ. See CASCARILLA.

CASCARA SAGRADA, sȧ-grä'dȧ (Sp., sacred bark), CHITTEM BARK, or SACRED BARK. The bark of *Rhamnus Purshiana*, the Californian buckthorn, a tree of the natural order Rhamnaceæ. The bark contains a crystallizable substance, cascarin; resins, a volatile oil, and malic, tannic, and oxalic acids. A fluid extract of the bark, as well as cascarin, is used for the relief of chronic constipation and also in gout. After prolonged use of it, constipation is cured in many cases, as its action is to increase the peristaltic action of the muscular fibres of the intestine. It is generally used in combination with other laxatives, and it forms an ingredient of many proprietary purgative medicines. See BARK; BUCKTHORN.

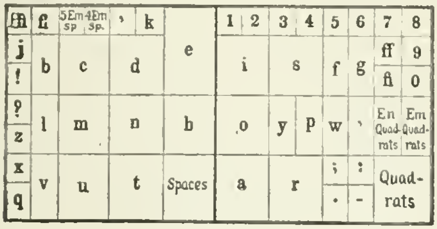
CAS'CARIL'LA (Sp., little bark, dim. of *cascara*, bark, husk, from *cascar*, to fall, from Lat. *cassare*, *quassare*, to shake, from *quatire*, to shake; associated by popular etymology with Lat. *cadere*, to fall). A name given in South America to many different kinds of bitter medicinal barks which form articles of commerce. Peruvian bark itself bears no other name in the districts which produce it. The name cascarilla is often used in medicine to denote the bark of *Croton eleuteria*. This plant is a small shrub found on the low hills of the Bahama Islands. The bark contains an essential oil, cascarillin, and a resin, and is a tonic, invigorating digestion, and promoting the functions of the stomach. In large doses it is very nauseating.

In medicine, cascarilla is used in the form of an infusion or a tincture, in cases of fermentative dyspepsia, chronic bronchitis, and certain fevers. It is one of the aromatic bitters, and stimulates the appetite and the digestive powers, increases the flow of the digestive juices, and is a mild astringent.

CASCINE, kȧ-shē'nȧ, LE. A park about two miles long, in Florence, bordering the Arno. It is laid out in fine walks and drives and is the favorite afternoon resort of Florentine society.

CAS'CO BAY. A bay on the southwest coast of Maine, about 20 miles in width at its mouth, from Bald Head on the east to Cape Elizabeth on the west, and extending about 12 miles inland (Map: Maine, C 8). The bay contains hundreds of small islands, most of which are occupied as summer resorts, and affords an excellent harbor. Portland (q.v.) is located on the west side of Casco Bay.

CASE (Fr. *casse*, *caisse*, Catalan *capsa*, Portug. *caixa*, from Lat. *capsa*, box, from *capere*, to take). A receptacle for type used in printing, which is divided into compartments or 'boxes,' each of which contains type of one character or letter. A pair of cases consists of an upper and a lower case: the upper one contains the capitals, small capitals, and some other letters that are only occasionally required; the lower one holding the small letters, figures, spaces, and most of the points. The places assigned to the several letters of the alphabet in the boxes of the case are not precisely the same in all printing-offices, but the differences are few. The different sizes of the boxes in the lower case depend upon the comparative frequency with which the several letters occur in composition, and the position in the case allotted to each letter is such as to afford the greatest facility in composing. The letter *e*, which is most used in the English language, has a box much larger than any of the other compartments, and is placed directly in front of the compositor. In the upper case the boxes are of uniform size, and the letters are placed in alphabetical order, the comparatively rare occurrence of capitals rendering it immaterial which letter is nearest the compositor's hand.



THE LOWER CASE.

CASE. In law, primarily a cause, that is, an action or suit taken as a whole. The word is used in this general sense in the United States Constitution, which extends the judicial power of the United States to "cases in law and equity, cases affecting ambassadors, etc." In a more limited sense, a case is one side of a suit or action, the body of evidence and law presented by one of the parties. The word is also used to denote a decided cause of action already recorded and cited in argument: thus the phrase *case law* is used to designate the species of legal argument founded on the examination and citation of decided cases; hence also the phrase *leading cases*, meaning cases in which the decisions have a wide application and set forth general principles which may govern many subsequent decisions. In the United States the term 'case' is often used in brief for *case on appeal*, meaning the statement laid before a court of appeal by an appellant, presenting the record and the entire evidence of the original trial, or a résumé of it. This allows the appellate court to review the findings of the jury as well as the law points involved, and in this the case differs from the *bill of exceptions*, which presents only the matters of law to the court of appeal. *Case agreed on*, or *case stated*, is a statement in which parties to a suit unite in laying before the court the facts of the case upon which they agree for a decision on the points of law involved. *Case reserved* is a statement drawn by counsel and certified to by the judge, to be used as a basis for argument on law points before a full bench of the court.

Action on the Case. A very important form of action is sometimes called *case*, in brief for *action on the case*, or still more fully, *action of trespass on the case*. This action did not exist at early common law, but was introduced by the Statute of Westminster II., in the reign of Edward I. (1286). It was designed to remedy certain defects in the common-law practice which failed to provide an adequate remedy for some classes of injuries by means of the common-law action of trespass. The phrase 'action on the case' is really equivalent to 'action on the circumstances,' and this form of suit avails when it is sought to recover damages for personal injuries not caused by an assault, or where the wrongful act was of such a kind that the injury was indirect or consequential. Actions to recover damages for libel or slander, for the conversion of personal property, for negligence, are examples of actions on the case. Assumpsit (q.v.) originated as a form of action on the case. In Great Britain the Judicature Acts have so classified injuries for which damages may be sought as in general to make this form of action obsolete; and in the United States the codes of civil procedure adopted in many States have generally abolished this and other special forms of action. Consult the authorities referred to under Pleading and Practice.

CASE, Augustus Ludlow (1813-93). An American naval officer, born in Newburg, N. Y. He entered the navy as midshipman in 1828, served in the Mexican War, and upon the outbreak of the Civil War in 1861 was appointed fleet-captain of the North Atlantic blockading squadron. Subsequently he was fleet-captain of the European squadron in 1865-66, was chief of the ordnance bureau from 1869 to 1873, and in 1874, at the time of the *Virginius* affair, was placed in command of the fleet which had been assembled at Key West. In 1872 he received the rank of rear-admiral and was retired in 1875.

CASE, Thomas (1598-1682). An English divine, born in Kent. He graduated at Christ Church, Oxford, became rector of Stockport in 1645, and subsequently rector of Saint Mary Magdalen, London. In 1649 he was removed from his benefice for refusal to pledge loyalty to the new system of government, and in 1651 was imprisoned in the Tower on a charge of high treason in having implicated himself in the Presbyterian plot for the Stuart restoration. In the same year he was released, and subsequently became rector of Saint Giles-in-the-Fields. He was a member of the deputation of Presbyterian clergymen sent in 1660 to congratulate the restored King, by whom he was appointed a royal chaplain. He was one of the most popular preachers of his day, and wrote several works, of which *Mount Pisgah* (1670; new abridged ed., 1836) is esteemed the best.

CASE-HARDENING. The process of converting the surface of cast or wrought iron articles into steel, thereby making them harder, less liable to rust, and capable of taking on a better polish. Fire-irons, portions of fine grate-fronts, gun-locks, and other articles of limited size are commonly so treated, but the process is sometimes applied to large objects. The articles are first formed, and being heated to redness, are sprinkled with a little powdered yellow prussiate of potash, and heated again. The result is that the heat decomposes the prussiate of potash, and the liberated carbon combines with the iron, forming a coating of steel on the surface of the articles. A former mode of case-hardening was to heat the articles, along with some animal matter, such as the parings of horns and a little common salt, from a half-hour to several hours. After being treated as described the articles were cooled in cold water, or in oil when they were of a delicate nature. Charcoal alone is also employed. The coating of steel is very thin, seldom exceeding one-sixteenth of an inch. Where a thicker coating is necessary, the articles are treated several times.

CASEIN, kā′sē-ĭn (Lat. *caseus*, cheese). An organic compound allied to albumin, found in the milk of the mammalia. The proportion of casein in milk varies, but averages about 3 per cent., and it may be coagulated and separated therefrom by the addition of acetic acid or of a little rennet, as in the manufacture of cheese (q.v.). In either case the casein separates as curd, which still retains attached to it some oil and salts, though the greater portion of these substances, along with the sugar, remains in the watery liquid or whey. The elementary bodies which enter into the composition of casein, and the proportion in which these are present in 100 parts, are—carbon, 53.83; hydrogen, 7.15; nitrogen, 15.65; oxygen, 22.52; and sulphur, 0.85. Casein is not affected by heat as readily as other albuminoid substances: it is not coagulated below the temperatures of 130°-150° C. It forms insoluble precipitates with solutions of the poisonous salts, acetate of lead, nitrate of silver, and bichloride of mercury (corrosive sublimate), and hence the efficacy of taking large doses of milk in cases of poisoning by those salts, as the casein in the milk, forming an insoluble compound with the poison, keeps it from exerting its deadly powers.

A compound of casein with lime is now extensively used in dyeing and calico-printing as a substitute for albumin for the purpose of fixing certain mineral colors. The compound is prepared by dissolving casein in dilute ammonia and adding lime to the solution. Solutions of casein, together with borax, in water, have been used as a substitute for gum arabic. See PROTEIN.

CASE IS ALTERED, THE. A comedy by Ben Jonson, produced in the winter of 1598-99, and printed in quarto in 1609, and in folio in 1692. Its sources are the *Captivi* and the *Aulularia* of Plautus. It received high praise from the author's contemporaries, but soon lost its appeal to the public. Consult Symonds, *Life of Ben Jonson* ("English Worthies" series, London, 1886).

CASELLI, kä-sĕl′lē, GIOVANNI (1815-91). An Italian physicist, born in Siena. He was an active popularizer of science, and established *La Recreazione*, a popular journal of physical science; but he is remembered chiefly as the inventor of a form of electric telegraph, the 'pantelegraph,' which for years was in use in France.

CASE′MATE (Fr., perhaps from It. *casa*, house, chamber + *matta*, fem. of *matto*, mad, weak; provincially, dark; or possibly connected with Sp. *matar*, to kill, from Lat. *mactare*, to slaughter). Originally the loop-holed gallery of a bastion, constructed so that fire could be directed on an enemy with the maximum of effect and the minimum of risk. With the advent of shells, the term came to be applied to the bomb-proof vaults of fortresses or defenses, used for shelter purposes only. Casemate batteries are bomb-proof vaults or galleries, containing embrasures for the guns. The most widely known examples of casemate batteries are in the British fortress of Gibraltar (q.v.). See FORTIFICATION; SIEGE AND SIEGE WORKS. In the latter article will be found illustrations of casemates in trenches.

CASEMENT (abbreviation of *incasement*, from OF. *encassement*, casing, from Lat. *capsa*, box, from *capere*, to hold). A frame, or sash, with hinges to open and shut, forming the whole or part of the glazing of a window. German and English casements are made to open outward, and this is the usual form in the United States. French casements have two meeting leaves and open inward; they are used principally as doors opening on balconies or verandas. Also a name for a deep, hollow, circular molding, similar to the *scotia* of classical and the *caretto* of Italian architecture. The casement is very prevalent in the perpendicular style of Gothic architecture (q.v.) and is sometimes enriched with running foliage.

CASERTA, kä-sĕr′tä. An episcopal city in south Italy, capital of the Province of Caserta, and a military centre (Map: Italy, J 6). It is 21 miles north of Naples, of which it might be called the Versailles or the Potsdam. The ancient town (Caserta Vecchia), founded in the Eighth Century by the Lombards, is on the slope of a hill and contains several deserted palaces and the Twelfth-Century Church of San Michele; the modern town (Caserta Nuova) is on lower ground. Opposite the railway station is the famous but now unoccupied royal palace, built by King Charles III. and designed by Vanvitelli, to whom, in 1879, a marble statue was erected by Onofrio Buccini. This magnificent edifice, the construction of which was begun in 1752, forms with its four courts a huge rectangle, whose south side is 830 feet long and 134 feet high, and has 37 windows in each story. Through the middle of the rectangle runs a splendid colonnade 541 feet long, from the centre of which rises the beautiful marble stairway with 116 steps. The chapel of the palace is richly decorated in marble, imitation lapis lazuli, and gold, and contains the "Presentation in the Temple" by Mengs, an altar-piece by Bonito, and five paintings by Conca. The theatre of the palace has 40 boxes and 12 Corinthian columns of African marble from the palace of Serapis at Pozzuoli. Surrounding the rectangle are gardens laid out in the English fashion and containing splendid waterfalls, fountains, statues, and hedges. Water for the garden is brought 26 miles from Mount Taburno by an aqueduct which crosses the Maddaloni Valley on a daringly constructed bridge, 1700 feet long and 190 feet high. In the botanical gardens trees from the colder north have been successfully acclimated. In San Leucio, 2 miles north of the railway station, are a royal silk-spinning establishment and linen and tapestry weaving factories. In 1860 Caserta was the headquarters of Garibaldi and his army. The Province of Caserta is the ancient Campania Felix. Population, in 1881, 31,000; in 1901, 33,000.

CASE SCHOOL OF APPLIED SCIENCE. A technological institute, located in Cleveland, Ohio. It was established in 1881 and was endowed by Leonard Case in 1887. Since that time it has grown rapidly, having, in 1902, 126 professors and instructors and a student enrollment of 353. In addition to the original main building the school now has separate buildings for chemistry, electrical engineering, mechanical engineering, and astronomy. The facilities and equipment of the physical, chemical, electrical, mechanical, and metallurgical laboratories are very complete, and all departments are fully provided with modern machinery and apparatus. Valuable museums are also being developed. The courses of instruction include civil, mechanical, electrical, and mining engineering, physics, chemistry, architecture, and general science. Each course requires four years and leads to the degree of Bachelor of Science. Graduate courses are also given. Secretary of Faculty, Prof. Charles S. Howe.

CASE-SHOT. A projectile discharged from cannon and consisting of a number of balls or other particles inclosed in a case or covering from which they are released either at the muzzle of the gun or in flight. Case-shot consists either of grape, canister, or shrapnel (qq.v.) and is used for the most part at short ranges. See ARTILLERY; ORDNANCE; and PROJECTILES.

CASEWORM, or CADDIS-WORM. See CADDIS-FLY.

CA'SEY, SILAS (1807-82). An American soldier, born at East Greenwich, R. I. He graduated from West Point in 1826, served in the Seminole and Mexican wars, and for services in the latter received the brevet rank of lieutenant-colonel. In 1861, with the rank of brigadier-general of volunteers, he organized and disciplined the recruits at Washington, D. C., and later in the war saw service in the field and distinguished himself at the battle of Fair Oaks. From 1863 to 1865, he served as president of the board appointed to examine candidates for officers in the colored regiments, and in the latter year he was brevetted major-general. He retired in 1868. He published *Infantry Tactics* (2 vols., 1861), and *Infantry Tactics for Colored Troops* (1863).

CASEY, THOMAS LINCOLN (1831-96). An American military engineer, born at Sackett's Harbor, N. Y. He graduated at West Point in 1852, entered the engineer corps of the army, and passed through all grades of the service until, in 1888, he became chief of engineers and brigadier-general. As superintending engineer of public buildings and grounds in the District of Columbia, he had charge of the Potomac aqueduct, the completion of the Washington Monument, and the State, War, and Navy Department buildings, and the construction of the Army Medical Museum and Library. In 1889 Congress charged him with the duty of constructing the new Congressional Library Building.

CASGRAIN, kȧs'grăN', HENRI RAYMOND (1831 —). A Canadian historian, born at Rivière Ouelle, Quebec. He was educated at the Collège Sainte-Anne, P. Q., studied theology at the Quebec Seminary, and was ordained a priest in 1856. He was a professor at Saint Anne's until 1859 and priest at the Basilica, Quebec, from 1860 until 1873. In 1889 he was elected president of the Royal Society of Canada. Among his works may be mentioned *Légendes canadiennes* (1861); *L'Histoire de la Marie de l'Incarnation* (1864); *Histoire de l'Hôtel Dieu de Quebec* (1878); *Biographies canadiennes* (1885); *Un pélerinage au pays d'Evangeline* (1888); and *Montcalm et Lévis* (2 vols., 1891).

CASH. The unit of Chinese money, and sole official coin of China. It is a small round copper coin, with a square hole in the centre, and is equal to about one-eleventh of a cent in United States money.

CASH'EL (Ir. *Carsiol*, habitation in the rock). A town in Tipperary County, Ireland, 105 miles southwest of Dublin (Map: Ireland, D 4). It is irregularly built on the south and east slopes of an isolated height, rising abruptly from a rich and extensive plain, two miles east of the river Suir. Cashel is a Roman Catholic archdiocese. The ancient kings of Munster resided here. On the summit of the height, or 'Rock of Cashel,' are the most imposing ruins in Ireland. They consist of a cathedral, the largest and most remarkable in the country, founded 1169, burned 1495, and afterwards repaired; a stone-roofed chapel, built 1127 by Cormac McCarthy, King of Munster, and the most perfect specimen of the kind in the country; Hore Abbey, founded in 1272; the palace of the Munster kings; and a round tower 90 feet high and 56 in circumference. The round tower is built of freestone, but the other ruins of limestone. At Cashel, in 1172, the Irish princes first acknowledged the authority of the English King. Population, about 3000. Consult White, *Cashel of the Kings* (2 vols., Clonmel, 1863-66).

CASHEW (kȧ-shōō') **NUT** (Ger. *Acajounuss*, Sp. *cayou*, from Hind. *kājū*, *kānjū*). The fruit of a tree, *Anacardium occidentale*, of the order Anacardiaceæ. This is a spreading tree, 20 to 40 feet in height, and is a native of the tropical parts of both hemispheres, perhaps being primarily of American origin. It abounds in a milky juice, which turns black on exposure to the air, and is used for varnishing; but is so acrid as to produce painful inflammation when it comes in contact with the skin of some persons, or when they are exposed to its fumes. It is sometimes used to protect books and woodwork against ants. The fruit of this tree is a kidney-shaped nut about an inch long, seated on the thicker end of a pear-shaped, fleshy stalk, which varies in size from that of a cherry to a medium-sized pear. The shell is double; the outer shell is ash-colored and very smooth, and between it and the inner shell is a very caustic black juice. The kernel is oily, and very pleasant and wholesome, and is in common use as an article of food in tropical countries when roasted, being made into puddings and in various ways prepared for the table. In the West Indies it is put into wine, particularly old Madeira wine, to which it is thought to communicate a peculiarly agreeable flavor, and for this use it is sometimes imported into Great Britain. It is also, for the same reason, sometimes an ingredient in chocolate. The fleshy stalk, sometimes called the cashew apple, varies in size, and is white, yellow, or red. It is perfectly free from acridity, is acid and eatable, very pleasant and refreshing, and much used by the inhabitants of the countries in which the tree grows. A very pleasant vinous liquor is obtained from it by fermentation: and this, by distillation, yields a spirituous liquor which is highly esteemed for its flavor. A gum which exudes from the bark of the tree, quite distinct from the milky juice already mentioned, is bland, and very similar to gum arabic. For illustration, see Plate of CARNATIONS.

CASHGAR, kăsh-gär′. See KASHGAR.

CASHIBO, kȧ-shē′bō. A savage and cannibal tribe of Panoan stock, on the Pachitea tributary of the upper Ucayali, Peru. They are said to eat their old people at death, asserting that they do this in preference to having them become food for worms. Until recently they were at war with the whites and with all other tribes, having repeatedly killed the missionaries who attempted to civilize them. They are said to be of remarkably light complexion. The men are bearded, and wear long shirts. The women go entirely naked until after marriage. The name signifies a 'bat.'

CASHIERING (OF. *casser*, to discharge, from Lat. *cassare*, to destroy, from *cassus*, empty). The annulling or cancellation of the commission of a military or naval officer, as a punishment. It is a very severe form of dismissal from the service, and usually is not resorted to except in cases of disgraceful conduct. It absolutely precludes reinstatement. See ARTICLES OF WAR.

CASHMERE, kăsh-mēr′. See KASHMIR.

CASH′MERE GOAT, or SHAWL-GOAT. See GOAT.

CASH REGISTER. See CALCULATING MACHINES.

CASIMIR, kăs′ĭ-mēr, properly KAZIMIERZ. The name of a number of Polish princes and kings.—CASIMIR I., the Restorer, King of Poland (1034-58), was the son of the Polish King Miecislas II., and a German princess, Rixa, who ruled during Casimir's minority. She excited opposition and the young Prince was driven from his throne (about 1037). He was recalled, however, after a few years through the mediation of the German Emperor, Henry III. He strengthened Christianity in his dominions, which he enlarged by recovering Silesia from Bohemia. He married the daughter of Vladimir the Great of Russia. —CASIMIR II., known as the Just, was the youngest son of Boleslas III. He ruled over reunited Poland from 1177 and died in 1194. Casimir showed himself an able ruler in defending the peasants from the oppression of the nobles. He died much beloved by his subjects.—CASIMIR III., the Great, was born about 1310, and succeeded his father, Ladislas Lokietek, as King of Poland, in 1333. His possessions were threatened by the Teutonic Knights and the King of Bohemia, but he succeeded in winning the friendship of both. He added Red Russia to his dominions in 1341, and repelled the Tartars who threatened Poland. He gave the Bishop of Galicia the title of metropolitan. He developed commerce, protected the Jews and Germans, who made many settlements in his domains, and improved the condition of the peasants, so that he is known as King of the Peasants. In 1364 he founded the University of Cracow, after the model of Bologna, and it soon became the second university of Central Europe. He reconstructed the whole administration, and made Poland a power in Europe. He had three wives and two mistresses, one a Jewess. Casimir was the last of the dynasty of the Piasts.—CASIMIR IV. (1427-92), King of Poland and Grand Duke of Lithuania, was the son of Ladislas Jagellon. The Poles, after the death of King Ladislas III. in the disastrous battle of Varna, in 1444, invited his brother, Casimir, to accept the crown. This he did reluctantly in 1447. His determination to strengthen the royal power led to a threat of deposition by the nobles, and from that time Poland became more and more an aristocracy. Casimir waged a long war with the Teutonic Knights, who were compelled in the Treaty of Thorn (1466) to cede West Prussia to Poland and to render homage for East Prussia. In this reign Latin became the official language and part of the curriculum of the schools. Of his six sons, three succeeded each other on the throne of Poland, the eldest became King of Bohemia and Hungary, a second was made a cardinal, and a third was canonized by Paul V.

CASIMIR-PÉRIER, kȧ′zē′mēr′ pȧ′ryȧ′, JEAN PAUL PIERRE (1847—). President of the French Republic in 1894 and 1895. He was born in Paris, November 8, 1847. His father, Auguste Casimir-Périer, was Minister of the Interior in the administration of Thiers, and his grandfather was Premier under Louis Philippe. Jean Paul Casimir-Périer was decorated with the Legion of Honor for his conduct in the Franco-Prussian War. After the war he entered the public service, and held office in the Department of the Interior, of which his father was then head. He was elected to the Chamber of Deputies in 1874, and from December, 1877, to January, 1879, served as under secretary in the Departments of Public Instruction and War. Because of the traditions of his family, he was regarded as having Orleanist leanings, but he always acted as a moderate republican. In 1890 he was elected vice-president of the Chamber of Deputies, and in 1893 he became president of the Chamber, resigning December 3, when he became president of the Council and Prime Minister under President Carnot. The Ministry over which he presided distinguished itself by its firm attitude at a period of great disorder. He resigned May 22, 1894, and on June 27 he was elected, on the first ballot, to succeed the murdered Carnot as President of the Republic. He surprised the world by resigning, January 15, 1895, and retiring from public life. He had been embarrassed by factional polities, and he chafed at the restrictions imposed by the French Constitution upon the President. His own ministers snubbed him, and even transacted important business of State without consulting him. Many rumors were in circulation afterwards connecting his resignation with the Dreyfus case, and complications with Germany growing out of the latter. The ex-President appeared as a witness in the Zola trial, a sequel to the Dreyfus affair, but the rulings of the court shut out all his testimony that was of any importance or public interest.

CASINO, kȧ-sē′nō (It. dim. of *casa*, house, Lat. *casa*, cottage). In Italy, a place for social reunions. The Italian nobles have long had casinos detached from the palaces in which they live, whither they can retreat and enjoy themselves, and it is probable that the public casinos were the result of an attempt made by the middle classes to imitate their superiors. At the present time a casino is usually a place where musical or dancing soirées are held, containing a conversation-room, billiard-room, and café; but the name is very indefinitely applied in the United States.

CASINO. See Cassino.

CASINO, Monte. See Monte Cassino.

CAS′LON, William (1692-1766). An English typefounder, born at Bradley, Worcestershire. He was recognized as the greatest stamp-cutter and type-founder of his day. The library of the American Antiquarian Society, at Worcester, Mass., contains the earliest specimen of his printing-types in book form. It is entitled, *A Specimen of Printing Types by William Caslon and Son* (1763).

CASORIA, kȧ-sō′rē-ȧ. A city in south Italy, 6 miles north of Naples. It has many churches, and beautiful streets (Map: Italy, D 10). The district produces silk and wine. Population, in 1881 (commune), 10,000; in 1901, 12,905.

CAS′PAR. In Weber's opera *Der Freischütz*, an archer who, having sold himself to the Black Huntsman, is killed at the shooting-match by Max with one of the magic bullets given him by the devil.

CASPARI, kȧ-spä′rē. Karl Paul (1814-92). A German Lutheran theologian and Orientalist. He was born, of Jewish parents, in Dessau, Anhalt, studied in Leipzig and Berlin, became a convert to Christianity in 1838, and was appointed instructor of theology in the University of Christiania, Norway, in 1847. In 1857 he was made full professor. He wrote many philological and theological works, and made an especial study of the so-called ecumenical creeds. His principal publications are the *Grammatica Arabica* (1844-48), and *Alte und neue Quellen zur Geschichte des Taufsymbols und der Glaubensregel* (1879).

CASPE, kä′spȧ. A town in the Province of Saragossa, Spain, at the confluence of the Ebro and Guadelope, 50 miles southeast of Saragossa (Map: Spain, E 2). It has a fine Gothic college building, an ancient castle, and several ecclesiastical establishments. Olive and mulberry trees are extensively cultivated, and coal and iron are mined in the neighborhood. A congress of Aragonians, Catalonians, and Valencians assembled here in 1412 to settle the royal succession. Population, in 1901, 7808.

CASPER, käs′pẽr, Johann Ludwig (1796-1864). A German physician. He was born in Berlin, and studied at the university of that city and in Halle and Göttingen. In 1820 he became lecturer in the University of Berlin, and in 1839 full professor. From 1841 he was in charge of the medico-legal institute connected with the university. He exerted great influence, and his advice was constantly sought by the Government. His *Beiträge zur medizinischen Statistik und Staatsarzneikunde* (1825-37) marks the first serious attempt at the establishment of a science of medical statistics. This work was followed by the *Denkwürdigkeiten zur medizinischen Statistik und Staatsarzneikunde*, by which Caspar established himself as a high authority on this subject. A later work, entitled *Praktisches Handbuch der gerichtlichen Medizin*, has passed through eight editions.

CAS′PIAN SEA (translation of Lat. *Mare Caspium*, Gk. Κασπία θάλασσα, *Kaspia thalassa*, Κάσπιον πέλαγος, *Kaspion pelagos*). A tideless inland sea or salt lake lying on the boundary between Europe and Asia, and bordered on the north by the Russian provinces of Astrakhan and Uralsk, on the east by Uralsk and Russian Turkestan, on the south by Persia, and on the west by Persia, Transcaucasia, northern Caucasia, and Astrakhan. It extends about 700 miles in a north to south direction, and has a width varying from more than 100 to nearly 300 miles, and an area estimated at 170,000 square miles. The coast line is diversified by numerous capes, and by several bays or gulfs, of which the most prominent are Czarevitsa Bay and Kara Bugaz Gulf, on the east coast. The depression occupied by the Caspian Sea is a part of a great basin which in recent geological times included the Aral Sea and the Black Sea, and probably connected by an arm with the Arctic Ocean. The northern part of the Caspian depression is shallow, the depth of water being generally less than 75 feet, but in the southern part, where the shore line conforms to the slopes of the Great Balkan, the Elburz, and the Caucasus Mountains, the depth reaches 2000 feet, and in places even 3000 feet. According to recent measurements, the water-level is about 97 feet below that of the Black Sea, and while rising and falling periodically with the seasons, it experiences no appreciable permanent change. The waters in the southern part are saline, but in the northern shallow portion they are sufficiently fresh to freeze over in winter. The Caspian Sea receives the drainage of the Volga, whose basin covers an area of 500,000 square miles; of the Ural, Emba, Kur, and of many less important rivers. According to historical records, the Amu Darya also has been a feeder of the Caspian Sea, although now it flows into the Aral Sea. The Caspian Sea is of great commercial importance to the Russian Empire, as it forms, with the Volga River, a natural waterway between the European and Asiatic provinces. Communication has been established with the Baltic Sea by way of the Volga by means of canals. The great oil-fields on the Apsheron Peninsula, near Baku, thus find an outlet to northern Europe, while the crude and refined petroleum is also shipped by rail or transported through a pipe-line to Batum, on the Black Sea. The Caspian Sea has great salmon and sturgeon fisheries. The presence of seals and herring is an interesting zoölogical phenomenon. The most important Russian towns on the Caspian Sea are Astrakhan, at the embouchure of the Volga, Baku, Petrovsk, and Krasnovodsk, the last mentioned being the western terminal of the Transcaspian railway. Enzeli, Khorrema, and Aliabad are Persian ports.

CASQUE, kȧsk. See Helmet.

CASS, George Washington (1810-88). An American engineer and railway president. He was born at Dresden, Muskingum County, Ohio, graduated in 1832 at the United States Military Academy, and resigned from the army in 1836 with the rank of first lieutenant of infantry. Between 1849 and 1854 he was active in extending and perfecting the service of the Adams Express Company from Boston to the South and West, and in 1859-62 was president of the company. He was president from 1862 to 1884 of the Pittsburg, Fort Wayne and Chicago Railway, from 1869 to 1874 of the Grand Rapids and Indiana Railway, and from 1871 to 1873 of the Northern Pacific Railway. Shortly after his resignation from the army he was appointed to the engineer corps employed in the construction of the national road; and in connection with that work he erected over Dunlap's Creek, Pa., what is said to have been the first cast-iron bridge built in the United States.

CASS, Lewis (1782-1866). An American statesman. He was born on October 9, 1782, at Exeter, N. H., and was the son of Jonathan Cass, a blacksmith by trade, who joined the Revolutionary Army, rose to the rank of captain before the close of the war, reëntered the military service, removed to Ohio, and attained the rank of major. The son attended Phillips Exeter Academy, taught school for several months at Wilmington, Del., and followed his father to Marietta, Ohio, in 1799 or 1800. He studied law in the office of R. J. Meigs, later Governor of Ohio, was admitted to the bar in 1802, and in 1804 was elected prosecuting attorney of Muskingum County. Two years later he was elected a member of the Ohio Legislature, and in the same year married a daughter of the Revolutionary leader General Spencer. As a member of the Legislature, Cass was active in the advocacy of measures to thwart the intrigues of Aaron Burr (q.v.), and, in recognition of his services, President Jefferson appointed him in 1807 to a Federal marshalship, which he held for six years. In the War of 1812 Cass entered the service as colonel of Ohio volunteers, took part in Hull's disastrous attempt to invade Canada, strongly condemned that officer's surrender of Detroit, and was the chief witness against the defendant in the Hull court-martial at Albany, N. Y. (See Hull, William.) He was appointed major-general of Ohio militia in December, 1812, a colonel in the regular army in February, 1813, and a brigadier-general in the regular army in March, 1813; took an active part in the campaign of 1813 under General Harrison (q.v.), and on October 29 of that year was appointed Governor of the Territory of Michigan. Relations with the English and the Indians, as well as the internal conditions of a frontier territory, made the office particularly burdensome and enhanced the value of his services therein. During his long term of office he administered the affairs of the territory under his jurisdiction (which even after the organization of Indiana in 1818 included all the land as far west as the Mississippi and north of the northern line of Illinois) with the greatest ability and good judgment, making as many as twenty-two important treaties with the Indians, establishing an orderly and efficient civil government, and steadily upholding the dignity of the national Government against the frequent and unwarranted encroachments of the British authorities in Canada. In 1831, upon the reorganization of Jackson's Cabinet, he was appointed Secretary of War, which office he held during the Black Hawk and first Seminole wars and the nullification movement in South Carolina. In 1836 he was sent by Jackson as Minister to France, and during his residence in Paris attracted attention abroad, besides winning great popularity at home, by protesting vigorously against the quintuple treaty for the suppression of the slave trade, which involved the right of search, and which, owing largely to the influence of Cass, the French Government refused to ratify. He resigned in 1842, owing to his emphatic disapproval of the Ashburton Treaty just negotiated by the Secretary of State, Mr. Webster. He was informally proposed for the Presidency as early as 1842, but although, by favoring the annexation of Texas, he placed himself in harmony with the controlling element of his party, he failed to secure the Democratic nomination in 1844. Michigan, in the following February, elected him to the United States Senate, where he upheld the extreme American claims to the territory of the far Northwest. He opposed the Wilmot Proviso (q.v.) as untimely, and in a letter of December 24, 1847, to Mr. A. O. P. Nicholson, of Nashville, Tenn., first definitely formulated the doctrine which later became known as that of 'squatter sovereignty.' The Democratic Convention of 1848 nominated him for the Presidency, but the Van Burenites, or 'Barnburners' (q.v.), of New York, bolted the Democratic ticket, and the Whig candidate, General Taylor, was elected.

In January, 1849, Cass was elected to the Senate, to fill the vacancy caused by his own resignation upon entering the Presidential campaign, and two years later he was again elected for the full term. He favored Clay's compromise measures of 1850 (q.v.) upheld the Fugitive Slave Law (q.v.), and went with those of his party who voted for the Kansas-Nebraska Bill. He was a candidate for the Presidential nomination in the Democratic Convention of 1856, and his defeat was intensified by the election in Michigan of a Legislature strongly Republican, which resulted in his retirement from the Senate. President Buchanan called him to the Cabinet as Secretary of State, an office which he resigned in December, 1860, upon the President's refusal to reinforce the forts at Charleston, S. C. His closing years were spent in Detroit, where he was a pronounced supporter of the Union in the face of those who were at war against it. He died in Detroit, June 17, 1866, in his eighty-fourth year.

His latest biographer, McLaughlin, estimates his character in the following words: "He was a great American statesman, building up and Americanizing an important section of his country, struggling in places of trust for the recognition of American dignity and for the development of generous nationalism. With the great slavery contest his name is inseparably connected; he stood with Webster and Clay for Union, for conciliation, for the Constitution as it seemed to be established. He was one of those men whose broad love of country and pride in her greatness, however exaggerated, however absurd it may seem in these days of cynical self-restraint, lifted her from colonialism to national dignity, and imbued the people with a sense of their power." He has frequently been called a 'dough-face,' and a 'Northern man with Southern principles,' but, though he appears to have courted the Southern vote, his attitude seems never to have been one of weak subserviency. His persistent and thorough distrust and dislike of Great Britain, his belief in the doctrine of 'manifest destiny,' and the fact that he belonged to the older school of conservative statesmen, who put the integrity of the Union before everything else, are perhaps truer explanations of his political career." Besides numerous magazine articles on Western and Indian affairs, he published *Inquiries Concerning the History, Traditions, and Languages of the Indians Living Within the United States* (1823), and *France: Its King, Court, and Government* (1840). Throughout his life he was deeply interested in American history, and his various publications are still of value, "real additions to knowledge," says his biographer. He was also an outspoken advocate of temperance. His life has been written in the American Statesmen Series, by Andrew C. McLaughlin (Boston, 1891), who studies his career as that of a "representative pioneer in the old Northwest," one of the chief purposes of the volume being to show the development of that region and to trace the growth of its political life. Before the death of General Cass, W. L. G. Smith wrote the *Life and Times of Lewis Cass* (New York, 1856), in the preparation of which he had access to a diary which was kept by Cass on a tour in the Levant. Schoolcraft published the *Outlines of Cass's Life and Character* (Albany, 1848); and Young, the *Life and Public Service of Gen. Lewis Cass* (Detroit, 1852).

CASSABA, käs-sä'bå, or **KASSABA.** A town in Asia Minor, 36 miles east of Smyrna (Map: Turkey in Asia, B 3). It carries on a flourishing trade with the surrounding district in cotton, silkworms, and melons. In 1865 a large portion of the town was destroyed by fire, and in the same year there were many deaths from cholera. Population, about 23,000, three-fourths of whom are Mohammedans.

CASSAGNAC, kå'så'nyäk'. See GRANIER DE CASSAGNAC.

CASSAN'DER (Gk. Κάσσανδρος, *Kassandros*) (c.354-297 B.C.). King of Macedonia, the son of Antipater. His first appearance in history is in B.C. 323, when he was sent to Alexander in Babylon to defend Antipater against the false accusations of his enemies. On this occasion he incurred the displeasure of the Macedonian King by laughing in his presence at the Persian custom of prostration. After the death of Alexander, he was made chiliarch with Seleucus, and continued in this office after Antigonus became commander-in-chief. When Antipater, who was in charge of Macedonia, died in B.C. 319, he appointed, not Cassander, but Polysperchon, an old comrade-in-arms, as his successor. Cassander determined to contest the succession, and took refuge with Antigonus in Asia. Polysperchon joined with Olympias, the mother of Alexander. When Cassander appeared in Greece, many states joined his standard. He finally secured possession of Olympias, Roxana, and the young son of Alexander, and, after putting to death the first and imprisoning the others, he married, in B.C. 316, Thessalonica, the sister of Alexander. It was in honor of Thessalonica that he built and named the town of Thessalonica in Macedonia. The next year he rebuilt Thebes, which had been destroyed by Alexander, and immediately after entered upon a war with Antigonus. Peace was concluded in B.C. 312, and soon after Cassander strengthened his position as supreme ruler in Macedonia by causing Roxana and her son to be put to death. Later he joined forces with Lysimachus, Ptolemy, and Seleucus, to oppose Antigonus, and Antigonus was defeated and slain at the battle of Ipsus in B.C. 301. By this victory Cassander secured Macedonia and Greece. In 297 he was succeeded by his son Philip.

CASSAN'DRA (Gk. Κασσάνδρα, *Kassandra*). In the Homeric poems, the daughter of Priam and Hecuba, carried to Greece by Agamemnon, and there murdered by Clytemnestra. Other early epics told how at the capture of Troy she fled to the temple of Athena and clasped the image of the goddess, whence she was torn by the Locrian Ajax, who paid dearly for his sacrilege. She first appears as a prophetess in Pindar. According to one version she and her brother, Helenus, were left in the inclosure sacred to the Thymbræan Apollo, and during the night their ears were licked by snakes, whereby they acquired prophetic hearing. The usual version, however, told how Apollo had loved her, and gave her prophetic art, but when she refused to keep her promise and yield to his suit, he took away all belief in her prophecies. Accordingly, her warnings against the keeping of Helen and the admittance of the wooden horse were disregarded. The story of her return with Agamemnon and her murder by Clytemnestra is told in the *Agamemnon* of Æschylus. Later writers added many details by introducing Cassandra into many of the scenes attending the siege and capture of Troy.

CASSANO AL JONIO, käs-sä'nô ål yō'nê-ō. A city in south Italy, 42 miles north of Cosenza. It has sulphur springs, a cathedral, an Episcopal seminary, and an ancient castle in the heart of the city on an imposing mass of rocks from which is a splendid view of the valleys of the Coscile and the Crati, the ancient Sybaris and Crathis (Map: Italy, L 8). The Torre di Milo is pointed out as the tower whence was thrown the stone that killed T. Anius Milo, who was besieging Cosa (Cassanum) for Pompey. The country produces large quantities of olive oil. Population, in 1881 (commune), 9000; in 1901, 8700.

CASSANO D'ADDA, käs-sä'nô dåd'då. A town in north Italy on the right bank of the Adda, 16 miles east of Milan (Map: Italy, D 2). It has silk-factories, and has been the scene of three bloody battles—the first in 1158, between the Milanese and Emperor Frederick; the second, August 16, 1705, when the French under the Duke of Vendôme inflicted on Prince Eugène his only defeat; the third, April 27, 1799, when the Russians and Austrians under Suvaroff defeated the French under Moreau. Population (commune), in 1881, 7000; in 1901, 8782.

CASSARD, kås'sär', JACQUES (1672-1740). A French naval officer, born in Nantes. During the famine of 1709, while commanding two ships in the Mediterranean, he successfully convoyed through the English squadrons twenty-six transports laden with wheat bought in Barbary and bound for Marseilles. In 1710 he released a convoy of wheat blockaded in Sicily by an English fleet, and safely brought it to Toulon; and two years later, with eight vessels, he attacked the Portuguese colonies for ransom, and after seizing Saint Eustache sailed for Martinique with spoil of great value. In 1713 Cassard was declared by Duguay Trouin to be the greatest mariner of his day. Afterwards he became involved in a quarrel with Cardinal Fleury, by whom he was accused of irregularity in his accounts, was imprisoned, and died after a captivity of fifteen years.

CASSAS, kȧ'sä'. LOUIS FRANÇOIS (1756-1827). A French collector and designer, born in Azay-le-Ferron (Indre). He was a great traveler, and during his journeys made drawings of the various views, buildings, and monuments that he had seen. These were published in several volumes: *Voyage pittoresque de la Syrie, de la Phénicie, de la Palestine et de la Basse-Egypte* (1799; incomplete); *Voyage pittoresque de l'Istrie et de la Dalmatie* (1802); and others. He afterwards prepared a collection of models of celebrated buildings and examples of architecture which was bought by the Government for the institute. For eleven years Cassas was chief inspector of the Gobelins' manufactory in Paris.

CASSATION (Fr., from Lat. *cassare*, to annul, from *cassus*, empty), COURT OF. The supreme judicial tribunal of France. In French law the act of annulling the decision of a court is called *cassation*, and the function of cassation, as regards the judgments of all the other courts, is assigned to a special tribunal, called the Court of Cassation. The present organization and powers of the court date from the Constitution of the revolutionary year VIII. (1799-1800), which enacted that there should be "for the whole of France a tribunal of cassation, which shall pronounce on demands for cassation against judgments in the last resort pronounced by the tribunals," and that this supreme tribunal shall pronounce no judgment on the foundation or merits of the cause, but that, in case of its breaking the judgment pronounced, it shall remit the cause to the tribunal appealed from to pronounce another. Substantially the institution has retained its original character, notwithstanding all the changes of government which have occurred in France. The demand for cassation can be made only by the parties to the suit, or by the *procureur-général* of the Court of Cassation, acting in the public interest. Criminal as well as civil judgment may be reviewed by the court, even under certain circumstances the judgments of justices of the peace and of courts-martial, military and naval. The delay allowed for bringing a civil case before the Court of Cassation is three months for persons domiciled in France, six months for those in Corsica, a year for American colonists, and two for all persons resident beyond the Cape of Good Hope. In criminal matters the procedure is much more prompt, three full days only being allowed to the person condemned to bring his action of cassation, and the same space being given to the procureur-général. In all criminal and police cases, the Court of Cassation may pronounce judgment immediately after the expiration of this time, and must do so within a month. The court is divided into three sections, one of which deals exclusively with criminal matters. It consists of a president, who has the title of *first* president, and three vice-presidents, who are called presidents, 45 counselors or ordinary judges, a procureur-général, or public prosecutor, 6 substitutes, who have the title of advocates-general, and several inferior officers. The presidents and counselors are named by the executive for life, the other officers being removable at pleasure. No judgment can be pronounced unless eleven judges are present, the decision being determined by the majority. Where the numbers are equally divided, five judges are called in, and cases of peculiar difficulty may be judged of by the three sections united. The whole court, when presided over by the Minister of Justice, possesses also the right of discipline and censure over all judges for grave offenses, not specially provided for by the law. When thus constituted, the Court of Cassation may suspend the judges of the imperial courts from the exercise of their functions, and call them to its bar. The procureur-général of the Court of Cassation likewise possesses a surveillance over the procureurs-généraux of the imperial courts. See APPEAL; COURT.

CASSATT', ALEXANDER JOHNSTON (1839—). An American railway president, born in Pittsburg, Pa. He studied at Heidelberg and at the Rensselaer Polytechnic Institute, and from 1861 to 1882 rose in the service of the Pennsylvania Railway from rodman to first vice-president. In 1899 he became president of the Pennsylvania Company.

CAS'SAVA, MANDIOC, or MANIOC (Neo-Lat., Fr. *cassave*, Sp. *casabe*, *cazabe*, from Haitian *kasabi*), *Manihot utilissima*. A large, shrubby plant belonging to the order Euphorbiaceæ. Cassava is the West Indian name, and is used in the United States; manioc, or mandioc, the Brazilian; and in Peru and other parts of South America, it is called juca, or yuca. It is a native of tropical America, commonly grown in equatorial South America, in Central America, and the West Indies, where it was a chief source of food to the natives at the time of the discovery of America. Cassava is now also extensively grown in Africa, and has been introduced into other tropical countries. In the United States it is cultivated in Florida. The plant grows in a bushy form usually 6 to 8 feet high and with a spread of about the same dimensions. The brittle stems, containing a large, soft, white pith, spread out into many crooked branches bearing the green flowers and the broad, dark green, palmately divided leaves. Cassava grows best on light, sandy, dry soils. It is propagated by cuttings from the stems and branches, which are dropped into furrows and covered. The crop, cultivated with the implements used in the cultivation of corn, matures in about seven months. The roots are harvested by hand. They are large, usually from one to three inches thick and from one to three feet long. For illustration, see Plate of CARNATIONS.

Two varieties of Cassava are recognized, the poisonous and the non-poisonous, also called bitter and sweet cassava. The poisonous principle is hydrocyanic acid, which is contained in the juice of the plant. Both varieties yield a wholesome food, the volatile poison being driven off by heat in the process of preparation. In South America a sauce and an intoxicating beverage are prepared from the juice, while the root, grated, dried on hot metal plates, and powdered, forms the food commonly known there as farinha (Portuguese for meal). It is made into thin cakes by the action of heat, which softens and agglutinates the particles of starch. The starch of cassava separated in the ordinary manner from the fibre is the Brazilian arrowroot of commerce. This starch, dried quickly under the action of intense heat when in a semisolid and moist condition, agglomerates into small irregular masses and then forms the well-known article of food called tapioca. In Florida, where sweet cassava is grown, the roots are grated and used directly as a food for man. They are also fed to stock, and serve as a raw material in the manufacture of starch and glucose.

Feeding Value. The peeled root of fresh Florida-grown cassava contains on an average, 61.3 per cent. of water, 31.0 per cent. of carbohydrates, largely starch, and a little protein, fat, and crude fibre. Cassava flour, made in Florida, contains about 11 per cent. of water and 65 to 70 per cent. of starch, in addition to small amounts of protein, fat, crude fibre, sugar, gum, ash, etc. Cassava starch, like other starch, contains some moisture. The food value of cassava-roots and the products made from them depend principally upon carbohydrates, and especially upon starch content. As a food for man or animals, it is evident that these materials should be supplemented by nitrogenous foods to obtain a well-balanced ration. Cassava is fed to hogs and steers, and sometimes to cows.

CASSAY′. See Manipur.

CASSEL, käs′sel. Until 1866 the capital of the former Electorate of Hesse, now the capital of the Prussian Province of Hesse-Nassau, pleasantly situated on both sides of the Fulda, here navigable, in latitude 51° 19′ N. and longitude 9° 29′ E., about 35 miles southwest of Göttingen (Map: Prussia, C 3).

The town consists of the Altstadt, the Oberneustadt, and the new Hohenzollern quarter, all on the left bank of the river, and of the Unterneustadt on the right bank. The streets of the old town are crooked and narrow, but those of the newer portion are regular and broad and among the handsomest in Germany. The principal street is the Königsstrasse, the upper and lower sections of which are separated by the circular Königsplatz, remarkable for its echo. On the Friedrichsplatz, the largest square in Germany, are the old Electoral Palace, erected in 1769 and enlarged in 1821, and the Museum Fridericianum, built in 1769 by Landgrave Frederick II., with a collection of ancient sculptures and plaster casts. In the same building is the provincial library of 170,000 volumes and many valuable MSS., including the Hildebrandslied, dating from the Ninth Century. The brothers Grimm were librarians here from 1814 to 1830. One of the handsomest buildings in the town is the new Picture Gallery, of red sandstone, finished in 1877. It contains a fine collection of paintings accumulated by Landgrave William VIII. The Flemish and Dutch schools are particularly well represented, there being many fine paintings by Van Dyck, Rembrandt, and Hals. Among the other notable buildings are Saint Martin's Church, the post-office, and the Court Theatre, of which Ludwig Spohr was for some years conductor. Cassel is the seat of the provincial and district government and of the supreme provincial court. The town's affairs are administered by a municipal council of 48 and an executive board of 21 members. There is a paid as well as a volunteer fire department. The cost of keeping the streets clean is borne by the property-owners. There is a modern sewerage system and a copious water-supply, and the town owns and operates gas-works, an electric-light plant, and a slaughter-house.

In 1898 the municipal budget balanced at about $2,500,000. The assets of the city were nearly $6,000,000, the debts about $3,500,000. The schools require a considerable portion of the revenues. There are numerous educational institutions, including two gymnasia, three municipal high schools, and a score of technical schools. There are many hospitals and other charitable institutions. The industries include the manufacture of locomotives, machinery, ironware, surgical and other scientific instruments, etc. Cassel has excellent railway facilities, and two electric street railway lines serve to accommodate the city traffic. It is the seat of a United States consulate. Population, in 1890, 73,000; in 1900, 106,000. To the west of Cassel and connected with it by steam tramway lies the Palace of Wilhelmshöhe, erected in the latter part of the Eighteenth Century, in which Napoleon III. was detained as a prisoner from the fall of Sedan to the close of the Franco-Prussian War. Wilhelmshöhe is famous for its artificial cascades. The history of the town dates from the year 913, when, under the name of Chassala, it was the residence of King Conrad I. It received its first municipal rights in the Thirteenth Century from the Landgraves of Thuringia. In the Seven Years' War it was several times captured by the French. In 1807 it was made the capital of the newly formed Kingdom of Westphalia. In 1866 it was occupied by Prussian troops, and became a part of Prussia.

CASSEL, David (1818-93). A German historian. He was born in Glogau, of Jewish parentage, and was educated in Breslau and Berlin. From 1846 until the time of his death he was associated with several of the leading Jewish institutions of learning in Berlin. He was a prolific and very popular author, and published the following valuable contributions to Jewish literature: *Geschichte der jüdischen Litteratur* (1873): *Hebräisch-deutsches Wörterbuch* (1891); *Leitfaden für den Unterricht in der jüdischen Geschichte und Litteratur* (9th ed. 1895). His editions of the *Kusari* by Judah Hallevi, and of the *Menor Enanim* by A. dei Rossi, are also highly esteemed.

CASSEL, Paulus Stephanus (1821-92). A German author of Jewish descent, whose name was originally Selig Cassel. He was born in Glogau, Silesia; was educated in both Roman Catholic and Protestant schools; finished his study of history under Ranke in Berlin, and became a journalist. He was converted to Christianity in 1855. He was in the Prussian Chamber of Deputies in 1866-67, but declined reëlection, and was preacher of Christ Church, Berlin, and missionary of the London Society for the Conversion of the Jews from 1866 to 1891. He published numerous articles and books on the Jews and on religion and the history of civilization, but they were all hastily prepared, and are of little permanent value.

CASSELL, JOHN (1817-65). An English publisher, born in Manchester, the son of an innkeeper. As a temperance lecturer, he wandered to London, where he established himslf as dealer in tea, coffee, and patent medicines. In 1850 he began to act as publisher of his books, written to diffuse knowledge among the working classes. After carrying through many schemes he founded the publishing house of Cassell, Petter & Galpin (1859).

CASSIA, kăsh'ȧ (Lat., from Gk. *κασσία*, *κασία*, *kassia*, *kasia*, cassia, from Heb. *qetsī'ōth*, cassia, from *quatsa'*, to cut). A name given by the ancients to a kind of fragrant medicinal bark. Cassia is also the botanical name of a genus of plants of the natural order Leguminosæ, containing many species, more than 200 having been described as trees, shrubs, and herbaceous plants, natives of Africa and of the warm parts of Asia and America. They have abruptly pinnate leaves, and flowers with deciduous calyx of five somewhat unequal sepals and corolla of five petals. The leaves and pods of many species have a peculiar sweetish but nauseous smell, and a nauseous, bitter taste. They contain a purgative principle, and the leaves of some of the Asiatic and African species are highly valued and are much used as a medicine under the name of senna, the species *Cassia acutifolia* and *Cassia angustifolia* supplying the best. The leaves of *Cassia Marylandica* possess similar properties, and are now used to some extent in the United States. *Cassia fistula* yields the cassia-pods, pipe cassia, or purging cassia, of the shops. It is a large tree, a native of Egypt and other parts of Africa, perhaps also of the East Indies, where it is widely diffused and cultivated, as well as in the West Indies and in the warm parts of America. Its pods, which have obtained for it the name of pudding-pipe tree, are sometimes two feet in length, cylindrical, black, consisting of thin, brittle woody valves, within which is a cavity divided by numerous thin transverse partitions, each cell containing a single seed imbedded in a soft black pulp. It is this pulp that is the part used in medicine; it has a sweetish mucilaginous taste, and in small doses acts as a mild laxative. It is sometimes removed from the pods when fresh, or an extract is obtained after they are dried, by boiling and evaporating. It is said to contain 6t to 69 per cent. of sugar. The cassia-pods of the West Indies contain much more pulp, and are therefore more valuable, than those imported from the East. Cassia-bark, or cassia-wood, sometimes called China cinnamon, is a bark very similar to cinnamon both in appearance and properties; it comes, however, in thicker pieces and less closely quilled, and has a less sweet and delicate but more pungent flavor. It is the product of the *Cinnamomum cassia* or *aromaticum*, a tree of the same genus with the cinnamon-tree, a native of China and extensively cultivated there. It is highly esteemed by the Chinese, and is now largely imported into Europe. As it contains a greater proportion of essential oil, and is also much cheaper than true cinnamon, it is much more generally used. The oil which it contains is called oil of cassia, and is very similar to oil of cinnamon. Coarse cinnamon is sometimes sold as cassia. Cassia-buds are believed to be the dried flower-buds of the same tree which yields cassia-bark. They are now imported into the United States in large quantities, and are much used in confectionery. In flavor and other qualities they resemble cassia-bark; in appearance they are very similar to cloves.

CAS'SIAN GENS. A Roman patrician clan, which became plebeian and was esteemed among the most prominent of Rome. But one patrician member of the gens is mentioned, Spurius Cassius Viscellinus, consul B.C. 502. Under the Republic the family names are Hemina, Longinus, Parmensis, Ravilla, Sabaco, Varus, and Viscellinus.

CAS'SIA'NUS, JOHANNES, also called Johannes Massiliensis, or Johannes Eremita (c.360-c.435). A teacher of the ancient Church. He was born probably in Provence. He received a good education, went on a pilgrimage to the Holy Land, and became a monk at Bethlehem; then removed to Egypt, and lived there as an anchorite from 385 to 400. In the latter year he went to Constantinople, and there was made a deacon by Chrysostom. After the exile of the latter he went to Rome to lay the case before the bishop, Innocent I. (405), and lived in Rome for some years. He next is found in Marseilles, where he established a monastery for monks and a convent for nuns, and there died. His monastery was afterwards known as that of Saint Victor, of which the present Church of Saint Victor is the relic. It served as a model to a multitude of monastic institutions in Gaul and Spain. He also employed his pen in the promotion of monasticism, and his great work, dating from 420, and one which has been strongly influential, is *The Institutes of the Cœnobia, and the Remedies for the Eight Principal Faults*, in twelve books, four on the monastic rule and eight on the sins against which the monks had to contend—gluttony, incontinence, covetousness, anger, dejection, distress of heart, vainglory, pride. His second chief work is his twenty-four *Conferences* with various eminent monks upon monastic interests and the vexed questions of theology. It is the supplement to the *Institutes*.

Cassianus's Grecian erudition, and his dislike of dogmatic subtleties, led him to take part in two doctrinal controversies. He wrote *The Incarnation of the Lord*, against Nestorius, and in it pointed out the connection between Nestorianism and Pelagianism. Deeming that Saint Augustine had gone too far in his theory of irresistible grace, he utilized one of his Conferences to set forth his view that the grace of God always coöperates with our will for its advantage. This view certainly was an approach to that of Pelagius, and later was called semi-Pelagianism. (See PELAGIANISM.) As it gained support from the Massilian monks, Saint Augustine, having been informed of it by his friend, Prosper of Aquitaine, wrote strongly against it in his treatises *The Predestination of the Saints* and *The Gift of Perseverance*. The distinction has been thus wittily expressed: Saint Augustine regards the natural man as dead, Pelagius as sound and well, and Cassianus as sick.

Cassianus's works, which are all in Latin, appeared for the first time in entirely satisfactory form edited by M. Petschenig (2 vols., Vienna, 1886-88), and in English, translation by E. C. S. Gibson, in Vol. XI. of the *Nicene and Post-Nicene Fathers*, 2d series (London and New York, 1884), except that certain parts are untranslated, because considered indelicate. For the life and teaching of Cassianus, see the prolegomena of the editions named, and also Lombard (Strassburg, 1863).

CASSIAN WAY. A Roman military road from Rome to Arretium, Florence, and Lucca. The period at which it was built is unknown.

CAS'SIMERE (Fr. *casimir*, ultimately derived from Skt. *Kaśmīra*, Kashmir). A thin twilled cloth, either plain or figured, of wool, or wool and cotton, and much used in the manufacture of clothing. Cassimere was formerly known as *kersey* (q.v.) or *kerseymere*, a name which is itself a corruption of *Cassimere*.

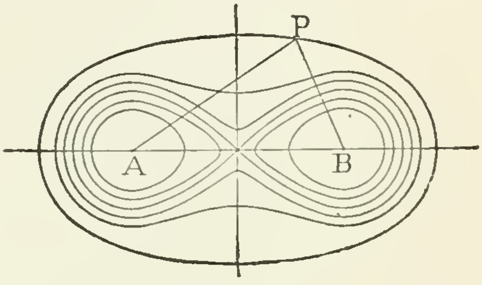
CAS'SIN, JOHN (1813-69). An American ornithologist, born near Chester, Pa. Coues says of him: "His distinctive place in ornithology is this: he was the only ornithologist this country has ever produced who was as familiar with the birds of the Old World as with those of America." He wrote *Mammalogy and Ornithology of the Wilkes Exploring Expedition* (1858). He was ornithologist of Perry's expedition to Japan, and with Professor Baird and George N. Lawrence published a "Monograph of Birds of North America North of Texas," in *United States War Department Pacific Railroad Reports*, Vol. IX. (Washington, 1858); *The Birds of North America* (1860); and *Illustrations of the Birds of California, Texas, Oregon, British and Russian America, 1853-55* (1862).

CASSINI, kȧs-sē'nē. GIOVANNI DOMENICO (1625-1712). An Italian-French astronomer, born at Perinaldo, near Nice. He was professor of astronomy at Bologna, and first of the family which for four generations filled the post of director of the observatory in Paris. He determined the motions of Jupiter's satellites from observations of their eclipses, and constructed tables of the same; discovered (1671-84) four of Saturn's satellites and determined their periods of revolution; and determined (1664-67) the rotations of Jupiter, Venus, and Mars. To him is attributed the first systematic observation of the zodiacal light. Cassini made a close approximation (10″) to the parallax of the sun, computed a table of refractions, gave a complete theory of the moon's libration, and gave as the obliquity of the ecliptic 23° 28′ 42″, instead of 23½°, and the eccentricity of the earth's orbit as 0.017, instead of Kepler's value, 0.018. Cassini's name is also connected with proving that the earth is an oblate spheroid. In pure mathematics he discovered the curve known as the Cassinian oval (q.v.), a curve which, according to Cassini, represented the form of the paths in space followed by the planets.

CASSINI, JACQUES (1677-1756). A French astronomer, son of Giovanni Domenico. He was born in Paris, and, on the death of his father in 1712, succeeded him as director of the observatory. He wrote several treatises on physical subjects, and in his *De la grandeur et de la figure de la terre* (1720) attempted to show that the earth must be a spheroid elongated at the poles. The Newtonians denied this, inasmuch as it was opposed to the ascertained facts of gravitation and rotation, which necessitated the earth's being a spheroid flattened at the poles. Jacques Cassini traveled extensively in Europe, making the acquaintance of the leading scientific men of the time. He was a member of the French Académie des Sciences, and of the Royal Society of London.

CASSINI, JEAN DOMINIQUE, Count de (1748-1845). A French astronomer, grandson of Jacques Cassini. He was the fourth member of his family to fill the post of director of the observatory of Paris. In 1789 he completed the great topographical map of France begun by his father.

CASSIN'IAN O'VAL. A bi-circular quadratic curve, the locus of a moving point the product of whose distances from two fixed points is constant. Its Cartesian equation is $(x^2 + y^2 + a^2)^2 - 4a^2x^2 = m^4$, where $2a = AB$. The polar equation is $r^4 - 2a^2r^2\cos 2\theta + a^4 - m^4 = 0$.



CASSINIAN OVAL.

The curve is symmetric with respect to both coördinate axes. If $m < a$, the real curve consists of two ovals; if $m = a$, it becomes the lemniscate; if $m > a$, it consists of a single oval. Cassinians are curves of the eighth class, except the lemniscate, which is of the sixth. In the case of two ovals, the curve is its own inverse with respect to a circle of radius $\sqrt[4]{a^4 - m^4}$. The curves are fully discussed in Briot et Bouquet, *Géometrie analytique* (4th ed., Paris, 1890; American ed., Chicago, 1896). For biography, consult Brocard, *Notes de Bibliographie des courbes géométriques* (Bar-le-Duc, 1897). See CASSINI, and LEMNISCATE.

CASSINO, kȧs-sē'nō. A city in south Italy, called San Germano until 1871, on the Rapido, 85 miles southeast of Rome (Map: Italy, H 6). The ancient Casinum, like the modern Cassino, was famous for foggy weather. San Germano was a frequent residence of popes and emperors, and in 1230 Gregory IX. and Frederick II. concluded peace here. On March 16, 1815, Murat was defeated here by the Austrians. Half a mile to the south are the ruins of an amphitheatre erected at her own expense by Ummidia Quadratilla, a Roman lady mentioned by Pliny in his letters (VII., 24). Farther on is the site of the villa of M. Terentius Varro, where Cicero (Phil. II., 40) says Antony led a riotous life. On a hill above the city is the famous monastery of Monte Cassino (q.v.). Population, in 1881 (commune), 12,000; in 1901, 13,473.

CASSINO. A game at cards played by two or more persons. Four cards are dealt to each player, and four are turned face up on the table. After the hands are played, the greatest number of cards counts the holder three, the greatest number of spades one, big casino (the ten of diamonds) two, little casino (the deuce of spades) one, and each ace one, so that eleven can be possibly counted by one person; the whole game is twenty-one. The play is to take from the table as many cards as possible, preferring spades, or aces, or big or little casino. The tricks are taken by pairing—that is, by matching one card in the hand with another on the table; thus, a ten will take a ten, or a nine and an ace, or four aces and a six, or any other combination of spots that makes just ten. Another part of the game is 'building,' or combining cards on the board with one in hand; for example, a player puts a four on a six to make up ten, meaning to take both when his turn to play again comes; but any one having a ten may take them before him; or if he builds a six, the next player may make it a nine, and the next still may put on an ace and call it ten, but in building, the one who makes any particular number must hold the card that will take it. Some persons make a progressive build—that is, if one has a nine and cannot at the time make a nine, he puts a four on a two and calls it six, having of course a three to make a nine when it is next his turn to play. But this kind of building is generally ruled out as irregular. In a modern variation of the game, the knave counts eleven, the queen twelve, the king thirteen, the ace one or fourteen, as the players may choose, and the 'joker' fifteen. This plan greatly enlarges the number of combinations; as, for instance, an ace may possibly take three other aces, four deuces, and a tray, making fourteen spots; or the ace may take the big and little casino and two aces, which would make six points in the game.

CASSIO, kăsh'ĭ-ō, Michael. The successor of Iago to the position of lieutenant of Othello, in Shakespeare's tragedy of the latter name. He is a weak-minded but reputable soldier, whose love of wine enables his enraged predecessor to direct against him the jealousy of Othello. He is finally stabbed by Iago.

CAS'SIODO'RUS, or **CAS'SIODO'RIUS**, Flavius Magnus Aurelius, Senator (c.480-c.580). A Latin statesman and writer, the most profound and enlightened scholar of an age of barbarism. He was born shortly before A.D. 490, at Scylaceum (Squillace), in Bruttii (now Calabria), of a noble family long settled in that region. His public services lay not so much in directing affairs as in perpetuating the Latin civilization under the Gothic rule. First raised to position under Odoacer, he held many important offices under Theodoric the Ostrogoth. From the questorship he passed to the consulship in 514; and during the following years, though engaged in public services, he devoted his leisure to literary work and study. At the command of Theodoric he prepared a *History of the Goths*, which has survived only in the epitome made by Jordanis. After the death of Theodoric, Cassiodorus published a collection of valuable historical State papers, under the title *Variarum Epistolarum Libri XII.*, which gives the best information we possess regarding the Ostrogothic rule in Italy (Consult Hodgkin, *Letters of Cassiodorus*, London, 1886). Late in life (toward A.D. 540) Cassiodorus retired from public life, and founded upon his estates at Vivarium, near Squillace, a monastery, in which he spent the remainder of his long life in study and pious endeavor. He required of his monks not only meditation, but also scholarship, and this included, as part of their monastic duty, the copying of manuscripts. To the happy example thus instituted we owe the preservation of most of the classic literature. Cassiodorus died at the age of almost 100 years. His works are published by Migne in the *Patrologia Latina* (1865), Vol. LXIX.

CAS'SIOPE'IA (Gk. Κασσιόπεια, *Kassiopeia*, Κασσιέπεια, *Kassiepeia*). A constellation in the Northern Hemisphere, sometimes called 'the Lady in Her Chair,' near Cepheus, and not far from the North Pole. It was in this constellation that the famous 'new star' of Tycho Brahe blazed out in November, 1572. This star is one of the most remarkable in astronomical annals. The brilliancy of its light, surpassing that of the large planets, and the suddenness with which it was extinguished, bear eloquent testimony to the extreme power of cosmic forces. Tycho's star retained its maximum brightness about ten days only. Although sixteen months elapsed before it finally disappeared from view, we do not know at present whether it still exists as a minute telescopic star, for Tycho's records, made before the invention of the telescope, do not fix his star's place on the sky with sufficient precision to allow a modern identification.

CASSIQUIARE, käs'sê-kê-ä'rå, or **CASSIQUIARI**, -rê. A river of Amazonas Territory, Venezuela, which leaves the Orinoco in latitude 3° 10′ N., longitude 66° 20′ W., taking from it one-third of its water, and after a rapid southwest course of about 250 miles, joins the River Guainia, a branch of the Rio Negro, in latitude 2° 5′ N., longitude 67° 40′ W. About 300 yards in breadth when it issues from the Orinoco, it gradually increases until at its union with the Rio Negro it attains a width of 600 yards. By the means of this singular river, water communication is established between the systems of the Amazon and the Orinoco.

CASSITERIDES. kăs'sĭ-tĕr'ĭ-dēz. See Scilly Islands.

CASSIT'ERITE (Lat. *cassiterum*. Gk. κασσίτερος, *kassiteros*, tin, of unknown origin, borrowed in O. Church Slav. *kositerŭ*, Skt. *kastīra*, Ar. *qazdīr*, tin). A tin dioxide that crystallizes in the tetragonal system. It occurs both massive and in the form of crystals, usually of a black or brown color, although sometimes red or yellow. Cassiterite is found in Cornwall, England (formerly in large quantities): in Bohemia and Saxony, on the Malay Peninsula, in Banca, Australia, and in Mexico. In the United States it is reported from Maine, Virginia, South Dakota, and California. It is an important ore of tin, as, when pure, it contains nearly 79 per cent. of that metal. The ordinary massive cassiterite is called *tin stone;* when found in botryoidal or reniform shapes it is known as *wood tin*, and when in the state of sand along the beds of streams it is called *stream tin*.

CASSIUS, kăsh'ŭs, Avidius. A Roman general under Marcus Aurelius. He was from Cyrrhus, in Syria, and won much renown by his victories over the Parthians. He marched against Mesopotamia, captured and burned

Seleucia, and proceeded as far as Babylon. Subsequently he quelled a dangerous insurrection in Egypt, and was appointed Governor of all the Eastern Provinces. He organized a revolt and attempted to seize the imperial throne, but was assassinated by two officers of his own army.

CASSIUS, Dio. See Dio Cassius.

CASSIUS, Purple of. A dark purple, red, or reddish-brown pigment. It was discovered by Andreas Cassius in the Seventeenth Century, and may be obtained as a fine flocculent purple precipitate on adding a solution of stannous chloride containing stannic chloride to a solution of gold chloride. It may also be obtained by treating an alloy of gold (2 parts), tin (3.5 parts), and silver (15 parts) with nitric acid, which removes the silver and oxidizes the tin. The composition of purple of Cassius is variable, but it is believed that gold is present in it in the metallic state. Mixed with borax or some fusible glass, it is used by potters to produce a rich purple or rose tint in the finer qualities of pottery, and it has long been employed to give a ruby-red color to the better qualities of glass.

CASSIUS LONGI′NUS, Gaius. One of Cæsar's assassins. At the breaking out of the Civil War, though a tribune of the plebs, he sided with Pompeius and the aristocratic faction against Cæsar. He was taken prisoner by the latter, who pardoned him, and even made him one of his *legati*. In B.C. 44, through the influence of Cæsar, he was made *prætor peregrinus*, and was promised the governorship of Syria in the following year. But his mean and jealous spirit could not endure the burden of gratitude imposed upon him by the generosity of the Dictator, and he resolved to be released by the murder of his benefactor. Having attached to himself the mutinous spirits among the subjugated aristocracy, and also won over M. Brutus, the pseudo-patriotic conspiracy was soon matured, and on March 15, B.C. 44, Cæsar fell by the daggers of assassins. The result of this bloody deed was not what Cassius Longinus had expected. The popular feeling—as displayed by the riots that broke out at Cæsar's funeral—was strongly against the murderers, and the military power fell into the hands of Marcus Antonius. Cassius Longinus therefore fled to the East, and made himself master of Syria. Afterwards he united his forces with those of Brutus. Having greedily plundered Asia Minor, they crossed the Hellespont in the beginning of B.C. 42, marched through Thrace, and took up a superior position near Philippi, in Macedonia. Here they were attacked by Antonius and Octavianus. The division commanded by Cassius Longinus was totally routed: on the other hand, Brutus succeeded in repulsing the troops of Octavianus. Cassius Longinus, supposing that all was lost, compelled his freedman, Pindarus, to put him to death. His wife, a half-sister of Brutus, survived him upward of sixty years. She died in the reign of Tiberius, A.D. 22.

CASSIUS PARMEN′SIS, or Gaius Cassius Severus. One of the conspirators against the life of Julius Cæsar. He was an adherent of his namesake Cassius, and fought on his side until their defeat at Philippi. Afterwards he joined Sextus Pompeius, and finally supported Antonius until the defeat at Actium. He went to Athens, but was arrested and executed, about B.C. 30, by order of Augustus. He made some pretensions to poetic ability, but he was not the Cassius alluded to by Horace as noted for the abundance and the poverty of his compositions.

CASSIUS VIS′CELLI′NUS, Spurius. A Roman of the Fifth Century B.C., distinguished as the author of what is called the first agrarian law of Rome. He was thrice consul—in B.C. 502, 493, and 486. The law which he presented was, presumably, a restatement of the earlier law of Servius Tullius. Despite the strong opposition of the patricians, led by his fellow-consul, Virginius Tricostus, he succeeded in effecting the legal passage of the law, which was, however, never enforced. In 485 he was accused by his enemies of seeking royal power, and, with these enemies as judges, was put to death as a traitor. See Agrarian Law.

CAS′SIVELLAU′NUS (c.50 B.C.). A native chieftain chosen by the Britons to be their commander when Cæsar made his second invasion, in B.C. 54. Cassivellaunus was routed in the first engagement, but continued to harass the Romans and to cut off all foragers or stragglers. Moved by reverses, he finally gave hostages to Cæsar, who commanded him also to pay a tribute and not to make war on the tribes who had aided the Romans.

CASSOCK. See Costume, Ecclesiastical.

CASSOP′OLIS. A village and county-seat of Cass County, Mich., 90 miles west by south of Jackson, on the Michigan Central and the Chicago and Grand Trunk railroads. It is known as a summer resort, being in a picturesque lake region. The industrial establishments include flour and saw mills, a grain-drill factory, bowl-factory, etc. Population, in 1890, 1369; in 1900, 1330.

CASSOWARY (Fr. *casoar*, Sp. *casoario*, *casobar*, Dutch *casuaar*, from Malay *kassuwaris*). A family (Casuariidæ) of ratite birds allied to the ostrich, but distinctively characterized by still greater shortness of wing, by a bony crest, by pendent wattles on the naked neck, and by three toes on each foot, the inner toe short and armed with a very long and sharp claw. There are also very important anatomical differences (see Huxley, *Proceedings Zoölogical Society of London*, 1867), especially in its digestive organs, which are not adapted to the same coarse diet. Cassowaries are still more closely allied to the emus, and with them form a group (Megistanes) peculiar to the Australian region. About twelve species of cassowary are known, of which the most familiar is that from Ceram (*Casuarius galeatus*), known since 1597 and frequently seen in menageries. It is the largest known bird except the ostrich, and its height, when erect, is about 5 feet. The color is brownish-black. The feathers are loosely webbed and hang down, so that at a little distance the bird seems clothed with hair. Those of the rump are 14 inches long, hanging down in place of a tail. The head and upper part of the neck are naked, and of a bluish color, and there are two pendent wattles, partly red and partly blue, on the front of the neck. On the breast is a callous bare part, on which the bird rests its body on the ground. The bony crest or helmet reaches from the base of the bill to the middle of the crown, and is about 3 inches high, exhibiting the most intense blue, purple, and scarlet, blended together. When attacked it defends itself by kicking obliquely backward with its stout, naked legs and feet, and by striking with its short wings, the rigid, barbless shafts of which, although useless even to aid in its running, are not without value as weapons. There are only about five of them in each wing, somewhat resembling the quills of a porcupine, and at the end of the last joint of the wing there is a spur.

The cassowary lays a few eggs, which are rough, greenish, and are incubated by the cock. Its flesh is black, tough, and juiceless. The cassowary is not infrequently to be seen in menageries in Europe, but is becoming more rare in its native regions, in which it is sometimes kept tame. Not much is known of the habits of any of these birds, which dwell in deep forests and are vegetable-eaters. They are frequently tamed by the natives and breed readily in confinement. Their skin and feathers are widely used in clothing and ornament; their bones point spears; and their flesh, though tough and dark, is eaten. The fullest account of the genus is that by Salvadori, in his great Italian work on the ornithology of the Papuan region. One species, having an excessively large helmet (*Casuarius Australis*), occurs in northern Australia. Another (*Casuarius Bennetti*), peculiar to New Britain, is known as 'moorup' (not 'mooruk,' as usually spelled). See Plate of CASSOWARIES, ETC.

CASSOWARY-TREE. See CASUARINA.

CAS'SUMU'NAR. See GINGER.

CAST (Icel., Swed. *kasta*, Dan. *kaste*, to throw). A work of art produced by a mold. A method of reproducing a work of sculptured art by means of molding. The work is first modeled by hand, then covered with plaster so applied that it may be removed in sections when dry, thus forming a kind of shell to the sculptured form beneath. These sections are put together and form the mold, which is filled with liquid plaster, the interior of the shell being so lubricated as to prevent the plaster from adhering to the casing. When this interior plaster is hardened, the case is again removed, and the reproduction of the original appears. The first mold is made over the modeled clay figure or group of figures fresh from the sculptor's hand. As the clay is perishable, it is necessary to imitate the original, and from the plaster, which is more durable, a number of replicas may be made. Even though the mold should be broken, another can now be taken from one of the plaster figures. Many of the masterpieces of antiquity are thus repeated, and they supply museums and schools of art as models for study. When a figure or group is cast in bronze, it is more properly called founding (q.v.). Casting has been in use from early times, and was employed by the ancients for multiplying their statues.

CASTAGNO, kȧs-tä'nyō, ANDREA DEL (c.1396-1457). A Florentine painter of the Renaissance. He was born at Castagno, a village in the Mugello district, near Florence, the son of a laborer and small landed proprietor. Although the name of his teacher is not recorded, he was at least influenced by Paolo Uccello, and perhaps, like the rest of the Realist school to which he belonged, by Donatello. His drawing is bold and firm, his color bright and crude, and the impression gained from his works is one of strength and power. His principal surviving works are a fine series of four frescoes from the life of Christ and nine figures in Sant' Apollonia, Florence, the equestrian portrait of Niccolo da Tolentino (1456) in the Cathedral, and a "Crucifixion" in Santa Maria Novella. The story, due to Vasari, that he murdered Domenico Veneziano to steal his secret of oil painting has long been proved a myth by the fact that his associate survived him several years. Castagno died in Florence August 19, 1457.

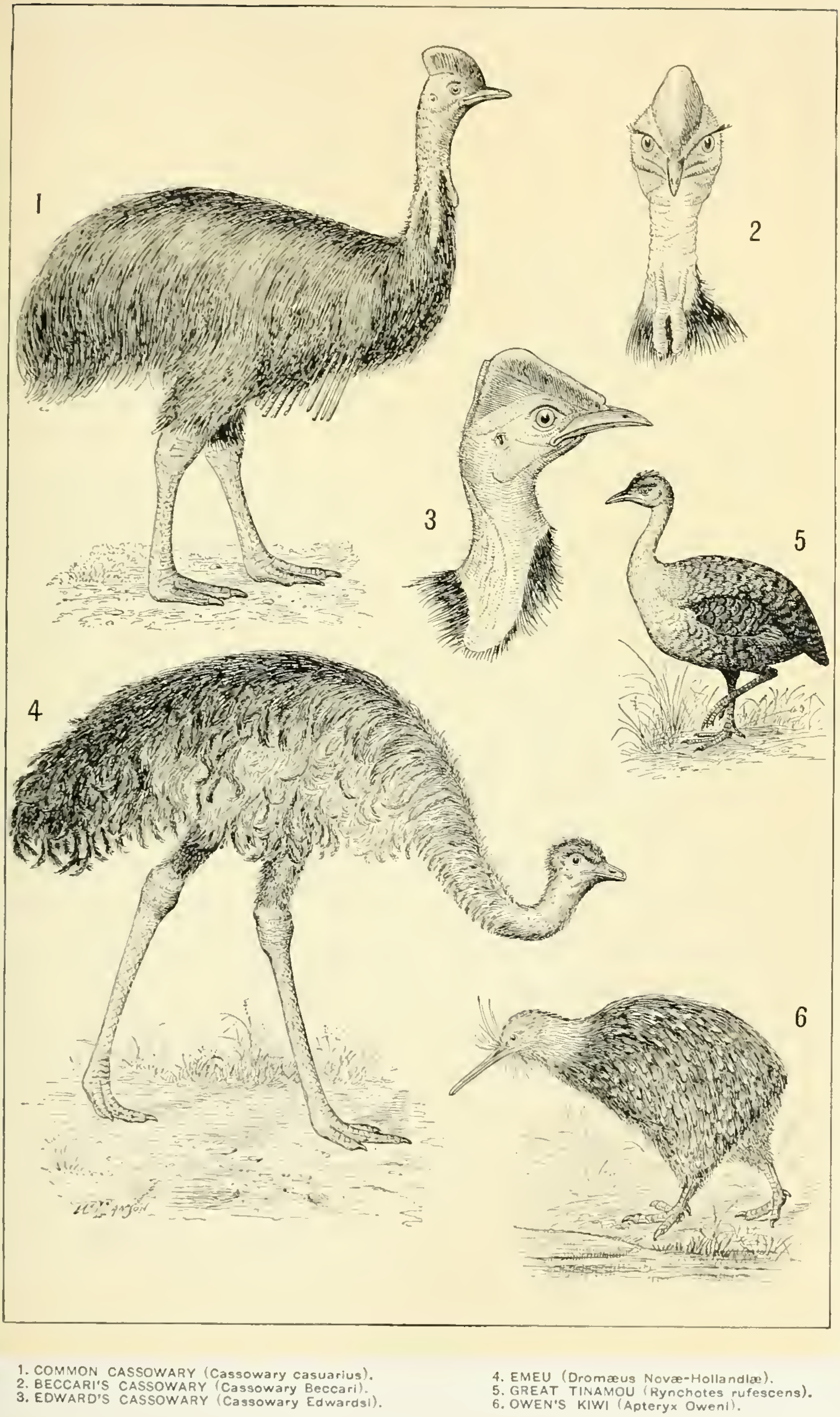
CASTAIGNE, kȧ'stăN', ANDRÉ (1861—). A French artist, best known as an illustrator. He was born at Angoulême, and studied in Paris at the Suisse Academy (1878-80), and later at the Beaux-Arts as a pupil of Gérôme and Cabanel. Among his notable pictures at the Salon, where he first exhibited in 1884, were a "Portrait of the Vicomte de Dampierre" (1888), and "After the Combat" (1899; Peabody Gallery, Baltimore). In 1890 he went to Baltimore as director and instructor of the Charcoal Club, an art school of that city. His first illustrations were Western scenes executed for the *Century Magazine* in 1891. He returned to France in 1894, and became an instructor in the Colorossi Academy, Paris. He works with almost equal facility in oils, water-color, charcoal, and pen and ink. His full-light effects were unique in American illustrations, and his peculiar fineness of touch defied the skilled engraver. His illustrative work has dealt much with American subjects, such as Texas cowboy life and the Columbian Exposition. His series of pictures for B. I. Wheeler's *Life of Alexander the Great* (New York, 1900) is also to be mentioned.

CASTA'LIA (Lat., Gk. Κασταλία, *Kastalia*, probably connected with Lat. *castus*, Gk. καθαρός *katharos*, Skt. *śuddha*, pure). A fountain sacred to Apollo and the Muses, situated on the slope of Parnassus, in the cleft between the great cliffs of the Phædriadæ, near Delphi, in Phocis. It was the 'holy water' of the Delphian temple, and all who came to consult the oracle were required to bathe, or at least to wash the hair, in its water. The Roman poets feigned that its waters filled the mind of those who drank of it with poetic inspiration. The fountain, whose waters are still pure and delightful, now bears the name of Saint-John.

CASTALIDES, kăs-tăl'ĭ-dēz. A name of the Muses, from the Castalian spring on Mount Parnassus, which was sacred to them.

CASTALIO, kȧs-tä'lyô, **CASTELLIO**, kȧs-tĕl'yô, or **CASTELLION**, SEBASTIAN (1515-63). A French Protestant theologian, born at Saint Martin du Fresne, a Savoy village, near Geneva. He received a thorough humanistic training, and about 1540 went to Strassburg, where he was befriended by Calvin, who, on his return to Geneva in 1541, appointed him rector of the high school and preacher. But, differing from Calvin on what were considered important points, he was compelled to resign in 1544, and went to Basel, where he lived in great poverty, as he had

CASSOWARIES, ETC.



1. COMMON CASSOWARY (Cassowary casuarius).
2. BECCARI'S CASSOWARY (Cassowary Beccari).
3. EDWARD'S CASSOWARY (Cassowary Edwardsi).
4. EMEU (Dromæus Novæ-Hollandiæ).
5. GREAT TINAMOU (Rynchotes rufescens).
6. OWEN'S KIWI (Apteryx Oweni).

a large family to support, until in 1553 he was appointed professor of Greek literature. Among his writings may be mentioned *De Hæreticis*, a treatise which argues against the right of the magistrate to punish heretical opinions, and which produced a reply from Beza; a Latin version of the Bible, published in 1551, and dedicated to Edward VI. of England; and a French translation of the Bible, dedicated to Henry II. of France. Consult his *Life*, by Buisson (Paris, 1892).

CASTA'NEA. See CHESTNUT.

CAS'TANETS (Fr. *castagnette*, from Lat. *castanea*, chestnut, so called from the shape). A musical instrument of percussion, usually in the form of two hollow nutshells, which are tied together by a band fastened on the thumb, and struck by the fingers to produce a rattling sound in keeping with the rhythm of the music. The castanets were introduced into Spain by the Moors, where they retain the name of castañuelas, from their resemblance to the form of the chestnut. The castanets are now much used in the ballet and in the opera.

CASTAÑOS, kȧ-stä'nyōs, DON FRANCISCO XAVIER DE, Duke of Baylen (c.1756-1852). A celebrated Spanish general. He was born in Madrid, and after receiving a military training in Germany entered the Spanish Army and served with distinction in the campaign of 1794 against the French. When the French invaded Spain, Castaños received the command of a division of the Spanish army, and on July 22, 1808, compelled 20,000 French under General Dupont to surrender at Baylen. It is asserted, however, by some, that the merit of this success belongs more to Aloys Reding, a Swiss by birth, and the second in command. In November of the same year Castaños was in turn defeated by the French at Tudela. Upon the arrival of Wellington he was again placed at the head of the Spanish army, which he led, under Wellington, in the important battles of Albuera, Salamanca, and Vitoria, in the last of which particularly he distinguished himself. In 1815 he was placed at the head of 80,000 troops destined to invade France, some of which had already crossed the frontier when the news came of the battle of Waterloo. Although he was not a favorite with the Court politicians, his talents could not be overlooked. In 1825 he was called to the State Council, where he became a decided opponent of the Carlist party. Castaños was made Duke of Baylen in 1833, and in 1843 became the guardian of Queen Isabella. He subsequently returned to his estates, and died at the age of 96.

CASTA'RA. A collection of love verses, written by William Habington to his wife, Lucy, daughter of William Herbert, first Baron Powis. They were published anonymously, in two parts, quarto, in 1634. A second edition, with additions, appeared in 1635, duodecimo; and a third, with still further additions, including the character of The Holy Man, was published in 1640, duodecimo. Modern editions are by Elton (Bristol, 1816) and Arber, in *English Reprints* (London, 1870). The poems themselves are avowedly formal and dispassionate, and are addressed variously to the 'chaste Castara' and to the author's personal friends and patrons.

CASTE, kȧst. In a general sense, an hereditary division or arrangement of society on the basis of occupation or other arbitrary condition; specifically, a class or grade so established, particularly among the Hindus. The word is not native to India, where the distinctions are best developed, and where the term was first applied specifically as well as in its more general sense, but is probably Portuguese (the earliest Occidental colonists in the Deccan and some other portions of India were from Portugal), in which language it denotes family, strain, breed, or race, the Portuguese (and Spanish) form being *casta*, the feminine of *casto* (Latin, *castus*, pure). Among earlier English writers the form was *cast*, used in the sense of aspect or mode (as in 'cast of countenance'), or perhaps in the archaic sense of breed, derived from a stock-breeder's term still colloquial in England; indeed, there is some question whether the English term is not prior to the Portuguese. The Sanskrit term is *verna*, signifying 'color,' and denoted originally, no doubt, the distinction between the lighter-complexioned Aryan invaders who entered India from the northwest, and the dark-skinned or colored aborigines whom they subjugated or drove onward before them. This fact throws considerable light on the origin of the social distinctions so highly developed in India and certain other countries. In any case the Occidental term is synonymous with 'chaste' (early French and modern English), and hence connotes purity, continence, freedom from taint, exclusiveness, and in general the attributes of race sense or ethnocentric sentiment.

The four great castes of India—the Brahmans, or Priests, the Warriors, the Husbandmen, and the Serfs, are as old in fact, if not in name, as the ancient sacred collection of hymns known as the Rig-Veda (cf. R.-V. 10, 90, 12; 8, 35, 16-18). The system, however, in its developed form is not sharply defined until the so-called period of Brahmanism. (See INDIA, section *Religion.*) The division of an early community into priests, warriors, and agriculturists or third estate, is a natural one, and is found likewise in ancient Persia. The fourth caste in India came into being when the invading Aryans subjugated the natives and made them captives or slaves. They allowed them to become a part of the body politic, but they denied them all religious rights and privileges which the three Aryan castes enjoyed. Disregarding minor subdivisions, the four Hindu castes, commonly recognized, are as follows:

(1) THE BRAHMAN OR SACERDOTAL CLASS. At the head of the elaborated Hindu caste system stands the Brahman, or Brahmin, the priest, in Sanskrit *Brāhmaṇa*, a term synonymous with sanctity and exaltation. The legendary account of Manu (q.v.) says that this class issued from the mouth of the god Brahma, at the moment of creation. The business of the Brahmans, through their knowledge of the sacred Vedas, is to perform sacrifices for themselves and others and to give spiritual guidance to the rest of mankind, which has to rely on them for the favor of the gods. The Brahmans are the chief of all created beings, and other mortals enjoy life through them. They are to be treated with the most profound respect, even by kings. The person of a Brahman is sacred; and it is his privilege to enjoy almost all immunities and exemptions. Special rules, on the other hand, are laid down

in the priestly codes, by which he shall preserve his sanctity.

(2) The Warrior Class. This is the Kshatriya, Ksettri, Chuttree, or military class, corresponding especially to the Rajputs of Rajputana in recent times. The name is derived from Sanskrit *kshatra*, signifying rule, power, and the Kshatriyas are said to have sprung from the arms of Brahma. Their duty is to fight and to protect the other classes. The relation between them and the priestly caste is a mutual one. The sacerdotal order cannot prosper without the military, nor the military without the sacerdotal; and the prosperity of both, in this world as well as in the next, is made to depend upon their cordial union. The priests allowed the Kshatriyas the cherished privilege of having the Veda imparted to them. In return the latter granted protection and support to the Brahmans. From necessity a warrior occasionally might assume the calling or duties of a man of the lower caste, but in only the most exceptional instances is there a record of a soldier or king rising to the dignity of the priestly class.

(3) The Vaisya or Husbandman Class. The third caste in the Hindu system is known as the Vaisya (later *Bais*, *Bice*) order, which forms the great industrial class of India. The members of this class make up the body of the people (Skt. *vaiśya*, from *viś*, folk) and they were first pastoral, then agricultural, and finally commercial—the third estate of the Aryans. They are described as being sprung from the belly and the thighs of Brahma, at the time of creation. As an Aryan, the member of the Vaisya class shared with his warrior brother the privilege of having a knowledge of the Veda and of witnessing the sacrificial rites accorded to the ruling order. Upon his gains, won by industrial pursuits, the warrior largely depended for support. Cattle-keeping, agriculture, trade, and business were his duties — in fact, the various branches of practical business life. Though superior to the Sudra or servile class, he was often closer in reality to this order than he was to the two higher castes.

(4) The Sudra or Servile Class. The fourth or lowest caste of Hindu society is the class of Sudras, Sooder (Skt. *śudra*)—a name of uncertain origin, but synonymous with 'degradation.' Sprung from the feet of Brahma, according to the dictum of Manu, their duty was to serve the three superior classes, especially the Brahmans. Their condition from the earliest time was one of subjection. They were not even allowed to hear the Veda, as that would be a defilement of the sacred text; they never could be invested with the sacred cord which brought regeneration to the other three classes when they were admitted into religion and thus became 'twice-born.' As originally non-Aryans or barbarians, they were allowed to come into contact with the upper classes only as menials, whose touch was equivalent to pollution, and whose slightest offense was punishable with death. They form to-day the basis of the lower classes of Hindu society, those that perform the most degrading services, but many have been able to rise by degrees to a position of respect, coincidently with a greater growth of laxity in observing caste restrictions.

The subdivisions and mutual relations of these four castes in early days, as in modern times, was quite complex. (See Hopkins, *The Mutual Relations of the Four Castes According to the Mānavadharmaśastram*, 1881; and Jogendra Nath Bhattacharya, *Hindu Castes and Sects*, 1896.) Mixed classes arose through forbidden marriages between the classes, and the utterly vile Pariahs or outcasts arose from their expulsion from the classes into which they were born. The additional castes and sub-castes are likewise to be accounted for in various ways.

Regarding the castes as originally ethnic or tribal, and recalling the devices of primitive peoples for maintaining tribal purity, it is of interest to note the provisions of the Manavadharmasastram (or code of Manu) respecting marriage: (1) "The vow (of studying) the three Vedas under a teacher must be kept for thirty-six years, or for half that time, or for a quarter, or until the (student) has perfectly learnt them. (2) (A student) who has studied in due order the three Vedas, or two, or even one only, without breaking the (rules of) studentship, shall enter the order of householders. . . . (4) Having bathed, with the permission of his teacher, and performed according to the rule the Samavartana (the rite on returning home), a twice-born man shall marry a woman of equal caste who is endowed with auspicious (bodily) marks. (5) A (damsel) who is neither a Sapinda on the mother's side, nor belongs to the same family on the father's side, is recommended to twice-born men for wedlock and conjugal union. (6) In connecting himself with a wife, let him carefully avoid the ten following families, be they ever so great, or rich in kine, horses, sheep, grain, or (other) property (viz.). (7) One which neglects the sacred rites, one in which no male children (are born), one in which the Veda is not studied, one (the members of) which have thick hair on the body, those which are subject to hæmorrhoids, phthisis, weakness of digestion, epilepsy, or white or black leprosy. (8) Let him not marry a maiden (with) reddish (hair), nor one who is sickly, nor one either with no hair (on the body) or too much, nor one who is garrulous or has red (eyes). (9) Nor one named after a constellation, a tree, or a river, nor one named after a bird, a snake, or a slave, nor one whose name inspires terror. (10) Let him wed a female free from bodily defects, who has an agreeable name, the (graceful) gait of a Hamsa or of an elephant, a moderate (quantity of) hair on the body and on the head, small teeth, and soft limbs. . . . (12) For the first marriage of twice-born men (wives) of equal caste are recommended; but for those who through desire proceed (to marry again) the following females (chosen) according to the (direct) order (of the castes), are most approved. (13) It is declared that a Sudra woman alone (can be) the wife of a Sudra, she and one of his own caste (the wives) of a Vaisya, those two and one of his own caste (the wives) of a Kshatriya, those three and one of his own caste (the wives) of a Brahmana." ("The Laws of Manu," translated by Bühler, in *The Sacred Books of the East*, edited by F. Max Muller, Vol. XXV., 1886, pp. 74-77.)

There follow various other prohibitive and permissive provisions, with descriptions of the "eight marriage-rites used by the four castes (*varna*) which partly secure benefits and partly produce evil both in this life and after death." These and other provisions and descriptions illumine the entire subject of castes, and prove that, whatever the origin of the distinctions, they are now primarily ecclesiastical, in somewhat less degree connected with occupation, and only subordinately ethnic (racial or tribal). True, Halhed (*A Code of Gentoo Laws*, 1776), writing early and with good opportunities for observation, assumed the division to represent tribes, and Risley (*The Tribes and Castes of Bengal*, 1892) more recently correlates caste with physical type, and the ethnic hypothesis seems to find support in the native term connoting caste and color; but it is manifest in the first place that the Code of Manu is not directed primarily toward the preservation of distinct race-types so much as toward collective preservation of physique and elimination of the supposedly barbaric custom of totemism, etc., and in the second place that no aboriginal distinctions of type could survive the constant blending sanctioned by immemorial laws governing intermarriage. Moreover, the four or five castes commonly recognized represent but a small part of the classes actually established by Brahmanical law in different parts of India; each province has its own more or less distinct groups defined by craft and fixed by custom, the aggregate reaching many hundreds in number—no less than 2000 according to some students. (See Crooke, *Tribes and Castes of the Northwestern Provinces and Oude*, 1896.) Still further, it is evident that the development of castes is long past its prime; for not only were the caste lines weakened by every foreign invasion from the time of Alexander to that of Warren Hastings, but they were burst from within by ecclesiastical schisms, and most notably by the rise of Buddhism, itself a reaction from, and protest against, the intolerable bondage of the caste system, as shown by Rhys-Davis, and, still more recently, by Porter ("Caste in India," *American Anthropologist*, Vol. VIII., 1895, p. 23). While there is a presumption that the custom of caste was rooted in tribal or racial distinctions, it is inconceivable that such distinctions were ever so numerous and diverse as the arbitrary classes into which Indian society was divided before Buddhism arose.

With reference to caste at the present day in India, it may be added that English rule and Occidental influences have done much to break down the stringency of the caste system of the Hindus. The obligation of the son to follow the calling of his father is no longer so binding as it once was, unless it be in the case of a Brahman, and yet a Brahman may serve to-day as a soldier and some even have become cooks. Men of lower castes have risen to higher ranks and to positions of power; and loss of caste is not so serious as it may once have been. In most cases it may be recovered and without much ado. With the spread of Christianity, the advance of education, and the extension of the railway system throughout India, the barrier of caste tends to give way, and the difficulties that arise from the old Brahmanical legislation are no longer so exaggerated but that certain points may not be brought out in its favor, whatever may rightly be urged against caste as an institution.

While the system of caste attained its highest development in India in pre-Buddhistic times, it was by no means confined to that country and period. The Avesta (q.v.) shows for ancient Iran a like division of the community into priest, warrior, and husbandman, *Atharvan, Rathashtar, Vastrya Tshuyant.* (See Geiger, *Civilization of the Eastern Iranians*, English translation, 1885.) Indeed, the caste sentiment prevails in greater or less intensity among all peoples. In all monarchical countries there are class distinctions more or less closely analogous to the Hindu castes; in mediæval Europe class sentiment gained a hold, the strength of which may be measured by the persistence of the guilds into which it grew on the one hand, and the secret orders (Rosicrucians, Freemasons, etc.) on the other; yet here the sentiment was not inculcated by law and literature, and seldom crystallized by belief. The most instructive analogues of the Indian castes are found in still lower culture than that of the half-literary Hindus. The Blackfellows of Australia have an elaborate system of social regimentation, maintained by intricate marriage regulations and other ceremonies, all expressing a sort of instinctive law so complete that Caucasians find difficulty in following its ramifications. Various African tribes have social customs of nearly as great complexity interwoven with crude beliefs. The native tribes of the Western Hemisphere are much given to phratries, 'medicine societies,' and other intra-tribal organizations of primarily ecclesiastical character which correspond almost exactly with certain of the Hindu caste distinctions. The social classes of China are suggestively similar to those of the neighboring country. It is notable that, in the successive culture stages, from that represented by the Australian Blackfellows upward, the laws crystallized by the ceremonial observances grow simpler, more intelligible, and, excepting among the Hindus, where the primitive character is retained in social ordination by caste, more lax, or rather more subservient to current judgment. Accordingly, caste may be defined as a primitive device for maintaining social organization by means of ecclesiastical ordinances.

BIBLIOGRAPHY. The literature of caste is voluminous. In addition to the works above mentioned, attention may be directed to Sevort, *Les castes dans l'Inde* (Paris, 1896); Muir, *Original Sanscrit Texts on the Origin and Progress of the Religion and Institutions of India* (London, 1867-75); and the several standard works referred to in these publications, notably the translations of the Laws of Manu, by Bühler in the *Sacred Books of the East*, Vol. XXV. (Oxford, 1886), and by Burnell and Hopkins, *The Ordinances of Manu* (London, 1884).

CASTE. A sentimental comedy by F. W. Robertson, produced at the Prince of Wales's Theatre on April 6, 1867, and published in London, 1889, in his son's edition of his principal dramatic works. It was originaly presented by Marie Wilton (Mrs. Bancroft) and her company. F. C. Robertson, the author's brother, played the part of Captain Hawtree in a later production of the piece, and it was in the repertory of Mr. Hare on his American tour in 1897-98. It is regarded as the author's most successful work.

CASTEGGIO, kȧs-tĕ′jȯ. See MONTEBELLO.

CASTEL, kȧs-tĕl′ (Fr., It. *castello*, Sp. *castillo*, Portug. *castelh*, from Lat. *castellum*, dim. of *castrum*, camp). A name prefixed to various places in Italy, France, Spain, and Portugal.

CASTELAR, käs′tâ-lär′, Emilio (1832-99). A Spanish republican leader, born in Cadiz, September 8, 1832. He was the son of a business man, and at the death of his father was left in poverty, but managed to study at the University of Madrid. He then worked as a journalist and novelist until in 1854 a daring entrance into the field of political debate secured for him recognition as one of the most brilliant of Spanish orators. In 1856 he became professor of history in the University of Madrid, but lost the place in 1865, in consequence of an attack on the Queen in *La Democracia*, a radical journal. The paper was suppressed in 1866, and Castelar was sentenced to death for participation in the disturbance of June in that year, but he escaped to Switzerland, and subsequently went to France. At the beginning of the Revolution of 1868, he returned to Spain and resumed his professorship, and in 1869 was one of the few republicans returned to the Cortes. In that body he advocated the establishment of a republic, and vigorously opposed the schemes of a regency. Under the republic proclaimed by the Cortes after the abdication of Amadeus I. (q.v.) Castelar was made Minister of Foreign Affairs (February 11, 1873); but he resigned in June. On August 26 he was elected president of the Cortes, and on September 7 the Cortes chose him president of the Executive, investing him with extraordinary powers. His first act was to prorogue the Cortes and assume complete authority. He made energetic but ineffectual efforts to suppress the Carlists, and sent the Minister of War to Cuba, in person, to protect Spanish interests in that island. When the Cortes reassembled, January 2, 1874, a vote of confidence in Castelar was defeated, and he at once resigned. Thereupon, Pavia, as captain-general of Madrid, forcibly dissolved the Cortes, and appointed a provisional government with Marshal Serrano at its head. Soon after the pronunciamiento in favor of Alfonso XII., in December, 1874, Castelar went to Switzerland, whence in March, 1875, he sent back his resignation of the chair of history in the University of Madrid. Early in 1876 he returned to Spain and was elected to the Cortes, of which he was a member until 1893. During the reign of Alfonso XII. Castelar vigorously defended the reforms of the Revolution of 1868, but after the birth of King Alfonso XIII. (1886), perceiving that revolutionary methods were ill-suited to Spanish progress, he sought the realization of the revolutionary programme through legal and pacific means. His active opposition to the State had changed to a philosophical republicanism, revolution in politics with him had given place to evolution, and in 1893 he admitted that the monarchy was the only form of government then possible in Spain. In that year, seeing that universal suffrage was firmly reëstablished, he gave up politics for literary work. He was always, in fact, more of an orator than a man of action. He died in Murcia, May 25, 1899. Castelar was a prolific writer, like his political rival, Cánovas del Castillo. His published works include *La cuestion del oriente* (1876); *Historia del descubrimiento de America* (1892); *La politique européenne* (Paris, 1897-99); and several volumes of essays, speeches, novels, and travels. Consult: Hannay, *Don Emilio Castelar* (New York, 1896), discriminating and interesting; Madame Rattazzi, *Une époque: Emilio Castelar, sa vie, son œuvre, son rôle historique* (Paris, 1899), eulogistic but valuable chiefly for the extracts from Castelar's own letters; Araco, *Castelar, su vida y su muerte* (Madrid, 1900).

CASTELBUONO, kä′stĕl-bwō′nô. A town in the Province of Palermo, Sicily, Italy, 31 miles north of Caltanissetta (Map: Italy, J 10). It has noted mineral springs, and manna is cultivated and exported. Population, in 1901, 10,761.

CASTEL FRANCO DELL' EMILIA, fräŋ′kô dĕl â-mē′lê-á. A city of Italy, 8 miles northeast of Modena, the ancient Forum Gallorum, where in B.C. 43 Marc Antony defeated the consul Pansa only to be himself immediately afterwards defeated by Pansa's colleague, Hirtius. Important modern industries are match and paper making. Population, in 1901 (commune), 13,500.

CASTEL FRANCO VENETO, vâ-nā′tô. A city of north Italy, 34 miles northwest of Venice, pleasantly situated on the Musone (Map: Italy, F 2). It has an ancient castle, and in the principal church are frescoes by Paolo Veronese (q.v.) and an altar-piece by Giorgione (q.v.). Here the French, under Saint Cyr, defeated the Austrians under Prince Rohan, November 23, 1805. It is an important silk market. Population, in 1901 (commune), 12,551.

CASTEL GANDOLFO, gân-dŏl′fô. A town on the west shore of Lake Albano, about 13 miles southeast of Rome (Map: Italy, M 2). It contains a Papal palace and has been a favorite summer resort of the popes, and by a guaranty of the Italian Government, given May 13, 1871, enjoys extra-territorial rights. Interesting to visitors are the villas of the old and powerful Italian families, and the ruins of a villa of Domitian. Population, in 1901 (commune), 2316.

CAS′TELL, Edmund (1606-85). An English Orientalist. He spent eighteen years in compiling a lexicon of Hebrew, Chaldee, Syriac, Samaritan, Ethiopic, Arabic, and Persian, working from sixteen to eighteen hours a day, and having fourteen assistants. The outlay was £12,000, which reduced him to poverty, but his losses were in part compensated by a number of preferments, among them that of prebend of Canterbury. He was also made professor of Arabic at Cambridge. Castell assisted Dr. Walton in the preparation of the polyglot Bible.

CASTELLAMARE, käs-tĕl′lá-mä′râ (It., sea castle). A leading city and seaport in south Italy, 17 miles southeast of Naples (Map: Italy, J 7). On account of its cool, healthy climate, delightful walks, sea-bathing, and sulphur springs, it is a summer resort of the Neapolitans, and a spring and autumn resort for foreigners. On the hill to the south are the ruins of the castle to which the town owes its origin and its name—built in the Thirteenth Century by Emperor Frederick II. and made stronger with towers and walls by Charles I. of Anjou. The Villa Quisisana, now municipal property and fitted up as a hotel, is on the site of a house erected by Charles II. of Anjou and occupied by King Ladislas and his sister Joanna II. during the plague in Naples. In 1820 Ferdinand I. restored the building and gave it its present name. The park belonging to the villa is delightful, and from Mount Coppola, up whose slopes wind beautiful shady paths, is an entrancing view of Vesuvius and the Bay of Naples. Short, interesting excursions are made to Mount Faito, which commands a view of the olive-clad peninsula of Sorrento, the islands of the Sirens, Capri, and Mount Saint Angelo, the highest point near the bay, which is crowned by the ruins of the chapel of San Michele. Castellamare has a technical school, a theatre, an excellent fortified harbor, and a large royal arsenal for the building of war-ships. The principal imports are grain and iron, the principal exports wine and fruit. The fisheries are important, and there are macaroni, soap, leather, and cotton factories. Population (commune), in 1881, 33,000; in 1901, 32,841. Castellamare occupies the site of the ancient Stabiæ, which was desolated by Sulla during the Social War, and which, with Pompeii, was destroyed in A.D. 79 by lava from Vesuvius. The elder Pliny perished here while watching the eruption. Here, in 1799, the French general Macdonald defeated the allied English and Neapolitan forces.

CASTELLAMARE DEL GOLFO, dĕl gôl′fô. A seaport in Sicily, near the mouth of the San Bartolomeo River, and on the Gulf of Castellamare, 45 miles west of Palermo (Map: Italy, G 9). It was the port of the ancient Segesta, still carries on considerable commerce in grain, wine, and oil, and has tunny fisheries. Population, in 1881 (commune), 15,000; in 1901, 19,957.

CAS′TELLAN, or **CHÂTELAIN**, shȧ′t'-lăɴ′ (Fr. *chatelain*, OF. *castellain*, *chastelain*, from Med. Lat. *castellanus*, from *castellum*, castle, dim. of *castrum*, camp). In the Middle Ages, the keeper of a castle or burg. The office and the rank of the castellan varied in different countries. In France and Flanders the title 'castellan' belonged to the holders of certain demesnes, and was next in order of rank to that of a bailiff. In the later Middle Ages it applied to a lord having a castle and a fief with feudal jurisdiction. In Germany the castellan had the jurisdiction of a burgrave (q.v.). In the Kingdom of Poland the castellans were part of the Senate or superior legislative chamber. The castellan of Cracow was considered higher in rank than a palatine.

CASTELLANETA, kȧs-tĕl′lȧ-nä′tȧ. An episcopal city in south Italy, 24 miles northwest of Taranto (Map: Italy, M 7). It has a cathedral and several convents, and is a local market for fruit, olives, wool, and cotton. Population, in 1881 (commune), 9000; in 1901, 10,196.

CASTELLANOS, käs′tȧ-lyä′nôs, Juan de. A Spanish priest and poet, born in Seville about the middle of the Sixteenth Century. His principal claim to consideration is a poem, *Elegias de varones illustres de las Indias*, which gives a valuable historical account of the adventures of Columbus, Bobadilla, and Aguirre. It was published in 1589. Afterwards a second part and a third were added (1847-50).

CASTELLI, kȧs-tĕl′lē, Ignaz Franz (1781-1862). An Austrian poet. He was born in Vienna, whence he was banished by Napoleon I. because of the patriotic military songs composed by him, one of which, *Kriegslied für die österreichische Armee*, attained a wide popularity. The success achieved with his opera, *Die Schweizerfamilie*, which was set to music by Weigl, obtained for him an appointment as Court poet at the Kärntnerthor Theater. He was a typical representative of the jovial humor of the Viennese, as exemplified in his *Gedichte in niederösterreichischer Mundart* (1828). He wrote more than 200 plays, principally translations and adaptations from the French. His collection of more than 12,000 plays, many portraits of celebrities, and a file of the play bills of the Viennese theatres from 1600 to 1862, is now in the Imperial Library in Vienna. His last publication was his *Memoiren meines Lebens* (4 vols., 1861-62).

CASTELLO, kȧs-tĕl′lô, Giovanni Battista (c.1500-70). An Italian painter and architect. He was surnamed Il Bergamasco by Philip II., who, in 1567, called him to Spain to aid in the restoration of the Alcázar in Madrid and the building of the Escurial, the fine stairway of honor in which was designed by him.

CASTELLO, Valerio (1625-59). An Italian painter, born in Genoa. He was the son of Bernardo Castilli, or Castello (1557-1629), an excellent historical and portrait painter. Young Castello studied under Fiasella, and afterwards in Milan and Palma. He is noted for his battle pictures. Among these are two different treatments of the "Rape of the Sabines." One is in the Palazzo Brignole, Genoa, and the other in Florence. There are some frescoes by him in the Church of Saint Martha, Genoa.

CASTELLO BRANCO, bräɴ′kô (anc. *Castraleucus*). The capital of a district and an episcopal see in the Province of Beira, Portugal, 44 miles northeast of Abrantes (Map: Portugal, B 3). It is built on a hill crowned by a castle, is surrounded by walls, and has a cathedral and college. It has manufactures of cloth, and marble is quarried. Population, in 1899, 7500.

CASTELLÓN DE LA PLANA, kä′stȧ-lyōn′ dȧ lȧ plä′nȧ (Sp., Castle of the Plain). A town of Spain, capital of the province of the same name, situated in a fertile plain, about 2½ miles from the Mediterranean, and 40 miles north-northeast of Valencia (Map: Spain, E 3). A magnificent aqueduct supplies the means of irrigation. Castellón de la Plana is, for the most part, regularly and well built, and has a pretentious town hall and an octagonal bell-tower, 260 feet high. The Church of La Sangre contains fine examples of the works of Francisco Ribalta, the celebrated Spanish painter, who was a native of Castellón de la Plana. The town has manufactures of linen, woolen, sail-cloth, paper, earthenware, and firearms, also brandy distilleries, and considerable trade. Population, in 1900, 29,966. Castellón de la Plana, in earlier times, occupied an elevation a short distance to the north of the present site, where ruins are still extant, but in 1233 was moved to the plain by Jaime I. In 1837 the Carlists, commanded by Don Carlos in person, made an unsuccessful attack on the town.

CASTELNAU, kȧ′stel-nō′, Francis, Count de (1812-80). A French traveler and naturalist. He traveled through North America (1837-41); was chief of a French Government scientific expedition to South America (1843-47), and afterwards held several consulships. He published *Expédition dans les parties centrales de l'Amérique du Sud* (1850-61).

CASTELNAU, Michael de, Sieur de la Mauvissière (1520-92). A French soldier and diplomat. He was thoroughly educated, traveled widely, and saw active service with the French army in Italy, where his courage and ability secured for him the friendship and patronage of the Cardinal of Lorraine. In 1557 he received a command in the navy, but soon rejoined the French army in Picardy. He was the bearer of messages from the Dauphin (afterwards Francis II.) to his betrothed, Mary Stuart, and after the death of Francis accompanied the Queen to Scotland. In 1562 he returned to France in consequence of the civil war, and served against the Huguenots in Brittany. Within the next ten years he was employed on important missions to Elizabeth of England and to the Duke of Alva. After the battle of Saint-Denis (1567), he was sent to Germany to solicit aid against the Huguenots, and on his return was made Governor of Saint-Dizier. From 1574 to 1584 he was ambassador at the English Court, and in this office attempted to effect a marriage between Elizabeth and the Duc d'Alençon. On returning to France he fell out of favor with the League, lost his governorship of Saint-Dizier, and was reduced almost to destitution; but on the accession of Henry IV. he was again intrusted with several important missions. The *Mémoires* of Castelnau, published in 1621, are accurate and impartial.

CASTELNAUDARY, kä'stĕl'nō'dä'rē'. A town in the Department of Aude, France, 22 miles north-northwest of Carcassonne, situated on a declivity, skirted at the base by the Canal du Midi, which here expands into a basin, and serves as a harbor (Map: France, J 8). It has manufactures of woolen and silk fabrics, and earthenware, and carries on an active trade in grain, wool, and flour. Population, in 1901, of town, 6683; of commune, 9397. It suffered severely in the crusade against the Albigenses, and was, in 1212, the scene of a battle between Simon de Montfort and Raymond, Count of Toulouse.

CASTELNUOVO, käs'tĕl-nwō'vō, Enrico (1839—). An Italian novelist. He was born in Florence, and was educated in Venice. In 1870 he edited the journal *La Stampa*, and in 1872 he became professor of the school of commerce in Venice. In the same year he published his *Racconti e bozzetti*, which was followed by his first novel, *Il quaderno della zia*, both of which works became very popular. Among his other publications may be mentioned: *La casa bianca* (1873); *La contessina* (1881); and *Due convenzioni* (1885).

CASTEL-SARRASIN, kä'stĕl' sä'rä'säN' (from *Castel-sur-Azin*, the Latin *Castrum Cerrucium*). The capital of an arrondissement in the Department of Tarn-et-Garonne, France, on the Garonne, 12 miles northwest of Montauban (Map: France, G 7). It has ruins of a castle of doubtful Saracenic origin, and the Church of Saint Sauveur's is an interesting Twelfth to Fifteenth Century structure. Manufactures of serge, linen, hosiery, and hats, and an agricultural trade are carried on. Population, in 1901, of town, 3394; of commune, 7858.

CASTELTERMINI, kä'stĕl-tĕr'mē-nē (ancient *Camicianæ Aquæ*). A town in the Province of Girgenti, Sicily, Italy, 23 miles southwest of Caltanisetta (Map: Italy, H 10). It is noted for its extensive mines of rock salt and sulphur. Population, of commune, in 1901, 13,022.

CASTELVETRANO, kä'stĕl-vā-trä'nō (Sicil. *Casteddu Vetrano*). A town in the Province of Trapani, Sicily, Italy, 20 miles southeast of Marsala (Map: Italy, G 10). It has an interesting old castle, some fine churches and convents, and a grammar school, in which is located the municipal museum of antiquities, many of whose objects were found at Selinus, in the vicinity. Grapevines, olives, and rice are extensively cultivated and good wine is manufactured. There are also manufactures of coral and alabaster articles. Population, in 1901, 24,510.

CASTI, kä'stē, Giovanni Battista (1721-1803). An Italian poet, who early took orders, and for a time taught literature in the Seminary of Acquapendente and at Montefiascone. Later he went to Vienna and entered the service of Joseph II. In company of the son of Minister Kaunitz, he visited the Courts of Saint Petersburg, Berlin, and other European cities, and on his return was appointed Court poet. On the death of Joseph II., Casti returned to Florence, and later made his home in Paris, where he died in 1803. His most famous work is a collection of clever but rather licentious *Novelle galanti in ottave rime* (1793), and *Gli animali parlanti* (1802), a lively and amusing political satire. He also wrote numerous comic operas, for two of which Paisiello composed the music.

CASTIGLIONE, kä'stē-lyō'nā. A city in Sicily on the north slope of Mount Etna, 2035 feet above the sea on the right bank of the Alcantara (Map: Italy, Sicily, K 10). It has a castle, and is a local market for wine, olives, and the best hazelnuts in Sicily. Population (commune), in 1881, 9473; in 1901, 12,998.

CASTIGLIONE, Baldàssare, Count (1478-1529). An Italian author and statesman. He was born at Casanatico, Duchy of Mantua, and studied in Milan. His many talents, wide knowledge, and polished manners made him a favorite of Guidobaldo di Montefeltro, Duke of Urbino, a great patron of literature, who entertained him at his Court, together with other distinguished men of letters. He was sent by the Duke as envoy to Henry VII. of England, to receive the Garter conferred upon his patron, and later represented the Duke's successor at the Papal Court, and in Spain, where in the last years of his life he became naturalized and was made Bishop of Avila. He died in Toledo, February 7, 1529, broken-hearted, it is said, because Clement VII. unjustly accused him of treachery. Castiglione's chief work is his famous *Libro del cortegiano* (Venice, 1528; latest edition, with full commentary by V. Cian, Florence, 1894), a manual for courtiers, notable for its finished style and for the high ideals which it sets forth as constituting the perfect courtier. This work, which is in four parts, and occupied the author's attention for upward of eight years, is cast in the form of a series of imaginary dialogues between the various men of distinction and noble ladies who met at the Court of Urbina, and discussed a wide variety of subjects, ranging all the way from art and literature to womanly virtue and platonic love. The volume was one of the most widely popular books of the period, both in Italy and elsewhere, formed the basis of Bascan's famous 'golden translation' into Spanish, and was pronounced by Dr. Johnson "the best book that ever was written upon good breeding." Castiglione's *Lettere* (2 vols., Padua, 1769-71) contain interesting contributions to the political and literary history of his time. Many distinguished Italians united in perpetuating his memory—Raphael in a portrait, and Tasso in a sonnet, while Giulio Romano designed the monument in Padua, for which Bembo provided the epitaph. Consult Martinati, *Notizie storico-biografiche intorno al conte Baldassare Castiglione* (Florence, 1891).

CASTIGLIONE, Carlo Ottavio, Count (1784-1849). An Italian philologist, born in Milan. At an early period he displayed a predilection for antiquarian studies, more particularly numismatics. When only 24 years of age, he published a description of the Kufic coins in the cabinet of Brera, in Milan, under the title, *Monete cufiche del museo di Milano* (Milan, 1819), which showed a great knowledge of Oriental languages and history. Castiglione's principal work in the sphere of Oriental literature is his *Mémoire géographique et numismatique sur la partie orientale de la Barbarie appelée Afrikia par les Arabes, suivi de recherches sur les Berbères atlantiques* (Milan, 1826), in which he seeks to ascertain the origin and the history of the towns in Barbary whose names are found on Arabic coins. Outside of Italy, Castiglione is perhaps best known by his edition of some fragments of the Mœso-Gothic translation of the Bible by Ulfilas (q.v.), which had been discovered, in 1817, by Cardinal Mai among the palimpsests of the Ambrosian Library. At first he published some specimens in conjunction with Mai, but in 1829, 1834, 1835, and 1839, appeared a variety of fragments of the Pauline epistles, edited by himself, and enriched with valuable disquisitions, commentaries, and glossaries. He died in Genoa, April 10, 1849. For his life, consult Biondelli (Milan, 1856).

CASTIGLIONE, Giovanni Benedetto (1616-70). An Italian painter and etcher, born in Genoa. He is called 'Il Grecchetto' (the little Greek). He was the pupil of Paggi, and then of Andrea de' Ferrari, and possibly of Van Dyck. About 1654 he became Court painter to Duke Charles I. of Mantua. He painted some portraits and historical pictures, but his best works are "Animals Entering the Ark" and "The Creation." There is also a fine "Nativity" by him in Genoa. He left more than seventy etchings of much cleverness and spirit. His brother, Salvatore, and his son, Francesco, were his pupils and imitators.

CASTIGLIONE DELLE STIVIERE, dĕl′lȧ stē-vyā′rȧ. A town in northern Italy, 6 miles south of the southern end of Lake Garda (Map: Italy, E 2). It is connected by street railway with Brescia and Mantua, has two churches, a technical school, and a castle. Its chief industry is silk-spinning. It came into the possession of the Visconti of Milan in 1339, and being acquired in 1404 by a branch of the Gonzaga family, was the capital of an independent principality which Austria absorbed by purchase in 1773. On August 5, 1796, Napoleon defeated the Austrians under Wurmser here, and because of the victory Marshal Augereau (q.v.) received the title of Duke of Castiglione. Population (commune), in 1881, 5000; in 1901, 5967.

CASTILE, kȧ-stēl′ (Sp. *Castilla*, from *castillo*, castle, from Lat. *castellum*, fort, on account of the numerous castles erected on the frontiers). A former kingdom of Spain, occupying an area of about 53,500 square miles in the central part of the peninsula (about one-fourth of the kingdom), and divided into the two old provinces of Old Castile, or *Castilla la Vieja*, and New Castile, or *Castilla la Nueva*. The former occupies the northern part and forms an elevated plateau, with an average elevation of about 2500 feet. It is walled in on all sides—on the north by the highest masses of the Cantabrian mountains, which separate it from the Basque provinces and Asturias; on the south by the high ridge forming the watershed between the Duero and the Tagus; while the Sierras de Ocejón, de Urbión, and Moncayo, and the heights of Leon and Tras-os-Montes bound it on the east and west. The high plateau of Old Castile is but scantily watered, and its natural characteristics are far from inviting. The chief rivers are the Duero and its tributaries, which are generally shallow during the summer. In many parts nothing is presented to the eye but a wide, almost treeless waste of land, unrefreshed by streams, in some parts monotonously covered with stunted grasses, and in others almost destitute of vegetation. The traveler may walk many miles without finding a village or even a solitary farmhouse. Not all of Old Castile is, however, an arid desert. In the southern part are found fertile tracts which yield fine grain, and even the olive can be cultivated under favorable climatic conditions. Iron and other minerals exist in plenty, but are not worked to any great extent, the chief industries being stock-breeding and cotton and linen weaving.

New Castile constitutes the southern part of Castile, and includes the Moorish Kingdom of Toledo. It lies between Aragon and Valencia on the east and Estremadura on the west, and has Murcia and Cindaluria on the south. It belongs to the basins of the Tagus, Guadiana, and Júcar. It has a less elevated surface, but in many other respects is not unlike Old Castile. It is mostly sterile in the more elevated parts, such as the elevated plateau of Madrid or Toledo, but very fertile in the deep river valleys. Olives, corn, pulse, and saffron are cultivated in some neighborhoods, but more attention is paid to the raising of domestic animals. Industry is almost entirely restricted to manufactures of coarse woolen goods. The yield of the salt-mines in the south is considerable, and quicksilver, especially at Almaden (q.v.), and iron, are plentiful. The commerce is insignificant and is greatly impeded by the lack of adequate transportation facilities.

Under the present administrative division of Spain, Old Castile is divided into the eight provinces of Burgos, Logroño, Santander, Avila, Segovia, Soria, Palencia, and Valladolid, with a total population of 1,764,440 in 1897. Some authorities include also the provinces of León, Zamora, and Salamanca in Old Castile. New Castile is divided into the provinces of Madrid, Guadalajara, Toledo, Cuenca, and Ciudad Real, and had a total population of 1,853,314 in 1897. Besides these provinces, the principality of Asturias, and the districts of Estremadura, Andalusia, Granada, and Murcia, also belonged to the crown of Castile.

The Kingdom of Castile was an off-shoot of the Kingdom of León, with which it was permanently united in 1230. It played the leading part in the reconquest of the Iberian Peninsula from the Mohammedans, and as such its history is inseparably identified with that of Spain (q.v.). Consult: Ayala, *Crónicas de los Reyes de Castilla* (2 vols., Madrid, 1779-80); and *Historia de las communidades de Castilla* (Madrid, 1897).

CASTILHO, kȧ-stē'lyō, ANTONIO FELICIANO (1800-75). A Portuguese poet, born in Lisbon. Although nearly blind from his sixth year, he became well known for his learning. He published translations of the *Metamorphoses* of Ovid (1841), and other Latin translations and original poems. The first volume which attained success was *Cartas de Echo e Narcisso* (1836). This was followed by the *Amore Melancolia*, and *Camoens* (1849).

CASTILLA, kȧ-stē'lyȧ, RAMON (1797-1867). A Peruvian general and statesman. He entered the Spanish Army in 1816, but five years later joined the revolt against Spanish rule. In 1830 he became chief of staff of the whole army, with the rank of brigadier-general. After the treaty with the President of Bolivia, Castilla went to Chile, and in 1837 joined the Peruvians who marched against Santa Cruz, the President of Bolivia. When the Revolutionists proclaimed Gamarra President, Castilla was made Minister of War. In 1841 he was one of the leaders of the Peruvian force that invaded Bolivia, and in 1845 was elected President of Peru. His successor, Echenique, became unpopular, and Castilla started a revolution, overcame Echenique, and became, in 1855, sole ruler of the country. One of his most important reforms was the abolition of slavery. In 1858 he was reëlected President, and in 1860 proclaimed a new constitution which granted universal suffrage and prohibited the exercise of any religion except the Roman Catholic.

CASTILLEJO, kä'stē-lyā'hō, CRISTÓVAL DE (c.1494-1556). A Spanish poet, born at Ciudad Rodrigo, Salamanca. He was early attached as a page to the person of the Infante Fernando, younger brother of Charles V., and subsequently Emperor of the Holy Roman Empire as Ferdinand I. He was later appointed secretary to that prince, and resided chiefly in Vienna. His comedies have entirely disappeared, but his poems survive in the editions of 1573, 1598, 1600, and others. In these three books, the latter part of the third of which is devoted to religious verse, he displays a spontaneous gayety of mind and facility of execution. He adhered to the traditional native forms, and stoutly resisted Boscán, Garcilaso de la Vega, and all the remaining innovators who sought to introduce into Spanish literature the sonnet, the *terza rima*, the canzone, and other Italian measures. His opposition was in part indirect, through improvement upon the old Castilian masters, and in part direct, as expressed in a satire against the new school and the sneers of 'Petrarquistas.' He wrote many successful ballads, and a *Dialogue with His Pen*, often referred to for its sprightly wit.

CASTILLO. See CÁNOVAS DEL CASTILLO.

CASTILLO, kȧ-stē'lyō, DOMINGO DEL. A Spanish pilot, one of the first European party to explore the Colorado of the West, in 1540. He left an excellent map of the Gulf of California and the lower course of the Colorado. See ALARCÓN, HERNANDO DE.

CASTILLON, kä'stē'yôN'. A town in the Department of Gironde, France, on the right bank of the Dordogne, 26 miles east of Bordeaux (Map: France, H 9). It is celebrated as the scene of the battle (July 17, 1453) between the forces of the English and the French, in which the former were defeated and their leader, Talbot, was slain. The battle led to the speedy reoccupation by Charles VII. of all the territory held by the English except Calais. Population, in 1901, of town, 2891; of commune, 3253.

CASTINE, kăs-tēn'. A town and port of entry in Hancock County, Maine, on Penobscot Bay, 36 miles below Bangor (Map: Maine, F 7). It has a good harbor and steamship connections, and some reputation as a summer resort. The chief industry is the manufacture of cordage, fishlines, etc. Castine has a town library and a custom-house, and is the seat of a State normal school. The government is administered by town meetings, held annually, or as often as required. Population, in 1890, 987; in 1900, 925. Here, in 1667, Baron de Castine established a small French colony, which, however, was soon abandoned. The English made the first permanent settlement in 1760. Consult Wheeler, *History of Castine, Penobscot, and Brooksville* (Bangor, 1875).

CASTING. See FLY-CASTING.

CASTING, METAL. See FOUNDING.

CASTING OUT NINES. See CHECKING.

CASTING VOTE. The vote of the presiding officer of a meeting in the case of an equality or tie vote. Whether such officer has the right to vote at all, or whether his right is limited to a casting vote, or whether, having the right to vote with the others, he may thereafter give a casting vote, is determined by the rules governing the particular assemblage. The Speaker of the House of Lords votes with the other members, but has no casting vote; while the Speaker of the Commons votes only when there is a tie. By the American Constitution, the Vice-President is president of the Senate, but has no vote except in case of a tie (Art. I., Sec. 3). State constitutions contain similar provisions relating to the Lieutenant-Governor. The Speaker of the Federal House of Representatives is chosen from among its members, and in some cases has the right of a double vote. In State legislatures the usage varies, the Speaker of the Lower House being limited, not infrequently, to a single vote which must be given with the votes of the other members. The same rule applies to the presiding officer at a meeting of a corporation, unless the charter expressly gives him the additional right of a casting vote. See PARLIAMENTARY LAW, and the authorities there cited.

CAST IRON. See IRON AND STEEL; FOUNDING.

CASTLE (Lat. *castellum*, a fort). The mediæval castle was of double descent, on the one side from the Greek acropolis (q.v.), the Roman Capitol (q.v.), and the citadel (q.v.) of the Byzantines and Goths; and on the other from the Roman camp or fort, and the Romano-Frankish villa—the earliest feudal fief. (A general treatment of this subject will be found under MILITARY ARCHI-

TECTURE.) The principal groups of such monuments are in Normandy and England; in northern France; along the Rhine; in northern Italy and the Roman province; and in a large part of the East, in a series belonging both to the Byzantine and Mohammedan Middle Ages.

Castles differ from forts in being primarily the permanent residence of a feudal lord, his family and dependents, instead of merely a stronghold occupied by a garrison. They may be divided into two classes: castles built for the defense of cities and subordinate to them—as at Carcassonne; and castles either entirely independent or connected with towns of little importance which often grew up around them. The class of independent castles is the most numerous and most characteristic of the times; it is, in fact, the great outward sign of feudalism. They will, therefore, be here treated almost exclusively.

Castle architecture ran its course from the Tenth to the Fifteenth Century, and is representative of a large part of the life of the times. In the Orient it may be studied in three principal classes—Byzantine castles, Mohammedan castles, castles of the Crusaders. In the West its natural divisions are rather chronological—pre-Norman, Norman, Crusading, Feudal, and Palatial Château periods. As a class, castles are even more important for what they represent than for what they are. In the form with which we are most familiar they are the creation of the nations of the North, under early influences, typifying at first the stern, self-reliant individualism of feudal society, its absorption in one idea, self-sacrifice and isolation, and the fostering of strong men. In studying its history we can trace the gradual softening of these ideals until the self-indulgent life of the Renaissance château is finally reached. But the Border Wars of Scotland, the feuds of Richard Cœur de Lion and Philip Augustus, the Barons and Magna Charta, and such events and atmospheres are not the only kind illustrated. The border wars of the Byzantine emperors and the Mohammedan emirs, the struggles of the Knights Templars and those of Saint John, the vicissitudes of the Old Man of the Mountain and his Assassins, also in their history crystallize around great castles in the East.

A word of explanation as to their origin. In the north of Europe, where wood prevailed in place of stone, the old Roman *castella* or detached military posts were often at first used, reinforced by palisades and wooden towers. The Frankish fortified villa was a quadrangle like a Roman camp, surrounded by ditch and palisade and having a mound in its centre as a final place of defense, surrounded by a trench and topped by a circular or polygonal wooden donjon or keep from 10 to 30 meters in diameter and 3 to 13 meters high. This was the pre-Norman castle of the north (e.g. at Sainte-Eulalie d'Ambarès and at Freidberg). Sometimes the circular form was preferred for the outer works, as in the Pipin Burg near Lehr (Germany). Such works have of course left few traces, except of the roughest ground plan of their earthworks. When the Normans settled down in the north of France in the Tenth Century, they began to build castles of a new type: their keeps, instead of being in the centre of a rectangular inclosure, were at one of its edges, so that direct communication with the outer country could still be had in case the outer palisades were captured. The materials remained at first the same—earthworks with palisades and a bank; then an earthen *motte* or mound, and wooden towers at the highest point. It was with such castles that the Norman chiefs repelled the Hungarian hordes during the Tenth Century and kept the river courses open for their raids. They took advantage, however, of the natural strength of localities better than the Franks, who, like the Romans, had built usually on the plain. The Norman castles in France and England even for a generation after the Conquest were of this kind; for example, at Builth in South Wales, Longtown, and Kilpeck in Herefordshire. The first advance was made late in the Eleventh Century, by building the keep or donjon of stone-masonry instead of earth, and immeasurably increasing its importance in relation to the outer line of earthworks. The keep at Malling in Kent, and London's famous keep, the White Tower, are survivals of this stage, which lasted, for the majority of castles, well into the Twelfth Century. England was covered with them; they were the principal means of firmly establishing the Norman yoke. Thirty went up under William the Conqueror; many more under his sons, and under Stephen (1135-54) 1115 were built. Meanwhile a great innovation had begun, as usual not in England, but on the Continent. Earthworks were discarded altogether and a complex system of stone-wall defenses was connected with the stone keep. It is at Arques, in Normandy, that William, uncle of Duke William, erected on a strong rocky promontory an epoch-making castle, with a square donjon at the upper end and with the entrance at the lower end protected by a double gate, two flanking round towers, and advanced earthworks. The interior had two courts or bailies—lower and upper—separated by a palisade. The circuit of walls was defended by eleven towers—all but two round. The donjon was against the outer wall. The natural rise toward the castle was defended by a palisade in front of a 'vallum'—called a *bailie*, in its primitive sense—back of which a wide fosse was cut in the soft rock from the scarp of which rose the castle walls. Along this scarp, subterranean corridors were cut to detect and oppose mining approaches, and the whole sub-structure was honeycombed with subterranean passages for sallies and intercommunication between the various parts. But Arques remained for a century a great exception in the importance of its outer circuit. As soon as the improved methods reached England many castles were rebuilt, such as "Dover and Rochester in Kent, Newcastle in Northumberland, Appleby and Carlisle in Cumberland, Brougham in Westmoreland, Richmond and Conisborough in Yorkshire, Portchester in Hampshire, Guildford in Surrey, Goodrich in Herefordshire, Norwich and Castle Rising in Norfolk, Hedingham and Colchester in Essex." (Parker.) They vary but slightly in plan, the keep being a massive square tower, with a square turret projecting from each angle. The entrance was quite high up, by a temporary wooden staircase, removed in time of danger. The interior was often divided by a vertical wall into two equal sections without communication except through passages cut in the upper part of this heavy division-wall. The stories were divided by wooden floors; very seldom by vaults. These keeps were small, dark, and uncomfortable, and until the later period when the outer defenses were strengthened, they not infrequently succumbed to famine after the outer works were carried. They were, however, uncomfortable as residences. This type, which has been described as "a strong post around which a fortified camp was traced," was followed in Normandy itself, at Chambois, Falaise, Nogent-le-Rotrou, and Le Pin; also in the French provinces under Norman influence, as at Chauvigny, Loches, Pouzanges, Montrichard, Montbazon, Beaugency, etc. Often the keeps of such castles were supplemented during the Twelfth and Thirteenth centuries, or even later, by stronger outer lines of defense than was customary when they were first built. The outer walls had been really only for the protection of the outbuildings from marauders, not to withstand an attack in force. Hitherto, even with these improvements, the castles of this type were incapable of offensive defense and became thoroughly insecure. The Crusaders had brought experience in approaching and attacking fortifications and were familiar with advanced methods of sapping and mining, with heavy machines and towers or belfries, through contact with the skilled engineers and their works among the Byzantines and Mohammedans of the East. A revolution took place in the plans of European castles, especially in France, before the close of the Twelfth Century. It is connected, however, more with royal castles built for national purposes with all the resources of the State, rather than with the private efforts of feudal nobles. This movement is individualized first at La Rocheguyon, built by Philip Augustus of France, and then, even more superbly, by its greater rival Château Gaillard, built by Richard Cœur de Lion, which defended all Normandy against France. At Gaillard the Eastern methods of flanking constructions, by which an aggressive defense could be made, was first carried out; the type of square donjon, which enforced ignorance of exterior operations and was weak for defense at the angles, was abandoned for the circular form; in fact, curved lines were everywhere employed. Another important innovation was the double concentric line of defense of the main castle, beside the keep. This central fort had a strong, irregularly triangular advanced fort separated from it by a trench, and with its nose toward the narrow strip of land that was the only vulnerable point of approach. The river Seine, that flowed by its base, and by a short curve there formed a promontory, was fortified in various ways—by a fort on an island defending a bridge with a barbican at one end and a large fortified burg at the other, with another farther on, all near the water-level, while above it a triple stockade barred the river. The whole system was, perhaps, the most perfectly devised of the feudal age; in it everything was sacrificed to military efficiency. It was by such works that the quality of masonry was perfected. Of the French *donjons*, or keeps, the most important of this period, now preserved, is that of Loches, still over 30 meters high. A little later was built (1223-30) the famous castle of Coucy, the most wonderful of mediæval private fortresses, and exhibiting for the first time the tendency to unite artistic magnificence and comfort with perfect military strength. The new principles of Gothic architecture, with its mastery of vaulted construction, alone made this possible. The chapels, halls of the knights, and halls of the feudal lords became structures of great size and high finish. Such were the old Louvre of Philip Augustus, the châteaux of Clisson and of Angers, and other royal castles of the Thirteenth Century. Under Oriental influence the old wooden balconies or hurdles (*hourds*) had long been replaced by stone-vaulted projections, galleries, and bartizans (*machicoulis, echauguettes*), thus doing away with the main defensive weakness of earlier castles. During this period the normal form and division of the most numerous class of castle, the Norman-English, was the following: A ditch, dike, fosse, or moat, surrounding the circuit, crossed by a bridge defended by a barbican and closed by a portcullis; then the outer wall or curtain, 20 to 25 feet high, with its towers and bastions, its terraced walk with single or double parapet; then the gate-house flanked with towers, leading into the outer bailey court with buildings for feeding, organizing, and lodging the garrison; then a second and higher inner line of defense with its fosse and gate-house, within which is a second or inner bailey, at the end of which is the keep containing hall, chapel, and accommodations for the suzerain or lord. Under the Plantagenets a small mound, called *cavalier*, was often added. At this time in England, and under the Valois in France, a great change in arrangement took place, characteristic of the increasing luxury of the Fourteenth Century. The inner court or bailey, instead of being merely a part of the defensive system culminating in the keep, became a centre of architectural splendor which now showed itself for the first time on the exterior. This culminated in such famous royal structures as Pierrefonds and La Ferté-Milon in France, and in such private castles as that of Vitré. Prominent English castles were Rochester, Windsor, and Alnwick.

An entirely distinct line of development had been meanwhile in progress in Italy, where it was not necessary, as in the north, to start from nothing. The feudal class established or encouraged by the Carlovingians could usually fortify themselves in ancient ruins of great strength, and they had before them Roman and Byzantine models which they carefully imitated. The Tenth Century saw the founding of many feudal houses; and the great monasteries such as Farfa, Subiaco, and Monte Cassino, in the fortresses by which they defended their possessions, furnished models to the barons. The Roman nobles were among the earliest to develop a type of castle; families like the Crescentii and Pierleoni, and later the Vico, Orsini, Colonna, etc., erected strongholds throughout the Roman province that far surpassed in size and magnificence any of the Norman or Rhenish castles, and were equaled only by the French and English castles of the Thirteenth Century. Such were Borghetto and Marozza. The dark, narrow, and unlivable Norman keeps would have seemed insufficient to families that held as their city fortresses such great antique buildings as the Colosseum, the Theatre of Marcellus, the Mausoleum of Augustus or of Hadrian, and the Circus Flaminius. Unfortunately, nobody has ever studied this phase of Roman architecture. In most other parts of Italy the establishment of the free communes led to the destruction of such castles during the Twelfth and Thirteenth centuries, as dangerous to the liberties of the people, and the nobles were forced to come to the cities to live, abandoning their mountain strongholds. This was the case first in the North and then in Tuscany. Only when the age of tyrants set in, in the Fourteenth Century, with the Scalas, Viscontis, Sforzas, Castracanis, did a new era of feudal castles begin in the north. Still, in the extreme north—in Piedmont, Savoy, and Upper Lombardy—there had been great feudal strongholds from the Tenth Century as at Bard and Challant. The famous castle of Canossa where the Emperor Henry IV. made his submission to Gregory VII. was one of these. Frederic II., largely through the Arab engineers he employed, introduced the advanced Oriental methods before 1250. His castles at Lucera, Barletta, Castel del Monte, and elsewhere were worthy, in size and magnificence, of their northern contemporaries. His French successors, the House of Anjou, added other features from beyond the Alps, and the south of Italy then saw the greatest development of military architecture in the peninsula (Thirteenth and Fourteenth centuries). Farther north the new style was exemplified in such structures as the castle of Castracane at Avenza (1322)

In Germany the architecture of the castle had remained during all this time in its infancy. It had retained the earthwork system up to the Twelfth Century and even the Thirteenth Century, as at Alt-Sternberg in Westphalia and the Prussian castles of the Knights of the Cross. In the Twelfth Century, stonework was introduced in the more advanced regions. We admire the picturesque ruins of the castles along the Rhine, such as the Drachenfels, Ockenfels, Ehrenbreitstein, Lahneck, Rheinfels, and many more. They did not embody any of the improvements we have noticed. Even as late as the Thirteenth Century the German castles were unprovided with any flanking defenses for their outer fortifications and they kept to the antiquated type of square donjon, rectilinear outer line of walls—in short, the simply passive system of the Eleventh Century—relying on the natural rocky situation. They were small, piratical eyries, never once entering the same class as Château Gaillard, or even Arques. Still, the elaborate network of these forts, their grouping to protect the whole Rhine valley, its cities and towns, make them interesting as a social and political, if not as an engineering study. Even socially, however, they did not show the concessions to comfort and magnificence in feudal life that we find in France, although it is stated that over 350 feudal castles were erected under the Hohenstaufens. Typical examples are the two castles at Rüdesheim, with three superposed terraces but without wall-towers or advanced works—with a typical *mota* in stone—a mere transformation of the old earthworks. At Egisheim the keep or *mota* is a regular octagon inscribed in the centre of a larger regular octagonal wall-circuit—symmetrical, but absurdly inadequate in view of the advances made in contemporary modes of attack. A fuller development of this scheme is at Steinsberg (Twelfth Century) with triple concentric lines of walls. There are, however, some interesting exceptions. Salzburg, near Neustadt (Eleventh and Twelfth centuries), bears certain resemblances to Arques, with its ditch cut along the crest of the hill, its two outer baileys and an inner one with a small keep; the wall-towers, however, are square. Interesting, historically, is the famous Wartburg Castle (Eleventh and Twelfth centuries), of the Landgraves of Thuringia, with its double bailey and its attempt to unite the great palatial residence with the fortress, a form in which the Germans anticipated the French of the Thirteenth Century. Here the palace hall was a long structure in the inner bailey quite distinct from the keep. The Frankenburg Castle in Alsace (Eleventh to Thirteenth Century) is interesting for its two keeps—one of the primitive rectangular type, the other later and circular. At Landeck, near Klingenmünster (Twelfth and Thirteenth centuries), we see not only the peculiar German scheme of superposed retreating platforms or baileys, but the unusual presence—for Germany—of square and round towers in the outer circuit. These and others are in Alsace and the Bavarian Palatinate. The castle at Münzenberg shows how in many cases of an extremely oblong plan there were two keeps in place of one, because as it became necessary to have a keep near the edge of the defenses, and often at the most vulnerable end, a second centre was required for the other end. Among the castles which, in the course of the advance made during the Twelfth and Thirteenth centuries, showed how even Germany had discarded all reminiscences of the Romano-Germanic *mota* or central earth-mound, is Fleckenstein in Alsace. Trifels and Neuscharffeneck further develop the combination of fortress with palatial halls, which was characteristic of the Wartburg, and no longer sacrifice the architectural beauty of their buildings to safety. The castle of Nuremberg is a superb example of a feudal structure commanding a great city (Twelfth Century). Its narrow, rocky setting gives it not only a strong walled advanced work toward the town and a double encircling wall, but three successive baileys on ascending levels, divided by deep ditches, heavy walls, and towered entrance-gates. Like so many other German castles, the palace takes the place of the keep in the inner bailey. This tendency reaches its climax in such extensive castles as that of Friesach, in the Thirteenth Century, where the main palace is in the form of a quadrangle in the centre of a long and fairly fortified enceinte and double outlying baileys and a central keep adjoining the palace. But far surpassing all private and even all royal castles in Germany is the central fortress of the Teutonic knights, Schloss Marienburg, whence they extended their political power and the Christian religion over North Germany, and even flung down the gauntlet to Poland. It represents the highest efforts of German Gothic in the military field, surpassing in mere beauty its prototypes in Palestine, of which we shall speak. Its great chapel, knights' hall, refectory, and other structures of the inner bailey, superbly grouped, are works of art both without and within, the brunt of military defense being borne by the outer lines of fortification. In the South, the castle of Karlstein (1347) in Bohemia is probably the most magnificent.

Spain was undoubtedly the last of Western countries to abandon the purely military castle; this was due to the long conflict between the Christians and the Moors, lasting to the very close of the Fifteenth Century. The Alhambra, at Granada, shows how the Moors ended by combining art and military science, and the immense piles at Coca and Olite show the permanence of the purely military architecture among the Spaniards. Feudalism of a certain kind had flourished in the Mohammedan East after the breaking up of the Caliphates of Bagdad and Cordova had led to a stage of smaller independent principalities. The castle-fortress had been developed by the Byzantines of the time of Justinian to a high degree of strength and scientific value, and they had inherited the old Oriental knowledge of double and triple lines of fortification and an overlooking acropolis, the specialty of the Hittite and Pelasgic peoples. The Arabs had borrowed from the Romans and Byzantines the idea of a frontier line of defense, but they outdid them in their scientific treatment and situation. The military despotism of both empires gave, during the Tenth and Eleventh centuries, great power to the local chiefs on the frontier, who became not merely stationary magnates, but established real feudal dynasties. Syria and Asia Minor are full of these frontier castles, whose castellans held the safety of the two empires in their hands. The studies of Rey (*Architecture militaire de la Syrie*) have shown how superb were the fortifications erected in Syria by the Crusaders in the early Twelfth Century; those of M. Bourgoin have proved that Mohammedan castles furnished the models for the works of the Crusaders. While the Normans were putting up rudimentary earthworks, the chiefs of Syria were living in castles built of cut stone. This explains why the warriors returning from the first Crusades shortly after 1100 revolutionized the science of military architecture in the north of Europe, and why for the origin of the great French and English castles of the Thirteenth Century we must go, as for so many other things, to the East. In fact, for the origin of the mediæval forms then adopted we must study the fortifications of Dara, Edessa, Antioch, and other places in Syria and Mesopotamia, built by Justinian and his successors.

The earliest of the remaining Crusaders' castles is supposed to be that of Giblet, a square plan with angle towers and a central square keep, and others like it at Blanche-Garde and Ibelin. A more advanced system is shown at Saona (c.1150), which is an example of the Syrian castles here planned to contain large garrisons. Its square Norman keep is supplemented by four bastions. Still further progress was made at Beaufort with two enceintes, two keeps, and some heavy bastions. These are followed at the close of the Twelfth Century by a different class of castles, those of the orders of Christian Knights that were the strongest defenders of the Holy Land. The Knights Templars had their central stronghold at Tortosa (1183) on a rocky projection in the sea by the city and surrounded on its elliptical land side by a wide double moat cut in the rock into which the sea could be turned, cutting off the fortress altogether. The two lines of defense separated by the moats were independent and both defended by square towers. The great keep on the farther side is also isolated by water. Although Tortosa is unsurpassed among Syrian fortresses in perfection of construction and is equal to the greatest in Europe, the castle of the Knights of the rival order of Saint John built on the Orontes, and commanding the road between Homs-Hamah and Tripoli-Tortosa, is the most important of all, and still remains substantially perfect. It stands in the same class as Château Gaillard, which it surpasses in size, is more advanced in scientific construction than Tortosa, and could easily hold a garrison of 4000 men. It should be compared with the great contemporary city castle of Carcassonne in France. It was provided with two large barbicans, with square and round towers, and is built with a high terraced inner bailey magnificently defended and commanded by a barbican-keep. A fortified inclined winding esplanade connects it with the lower outer bailey. Architecturally these castles of the knights afforded great opportunities. It was necessary to provide immense halls for the reunion of so large a mass of men—amounting often to a small army—men of equal rank, not underlings, as in the ordinary castle garrison. These edifices were military monasteries, and had halls corresponding to the monastic churches, chapter-houses, and refectories. Such castles presented altogether new problems to military architects, who for the first time worked out schemes for uniting outward strength with extensive interior halls. The result undoubtedly made possible the Valois-Plantagenet type in the West. Here, as in every other element of the castle, the type was created in the East.

In the Fifteenth Century the castle ceased to be primarily a stronghold, and became a place of residence. In such buildings as the château at Saint Germain near Paris, the transition to the palace is shown; the old forms were often retained, but they were meaningless. Gaillon, Blois, Fontainebleau, Chambord in France, Caprarola in Italy, Nettley Hall, Tichfield House and Longford Castle in England, the Albrechtsburg at Meissen in Germany, illustrate the new style and the passing of the old.

Bibliography. Very few books treat adequately of this subject For France, consult the articles "Château," "Donjon," "Siege," and "Tour," in Viollet-le-Duc, *Dictionnaire raisonné de l'architecture française du XI^e au XVI^e siècle*, (10 vols., Paris, 1858-68). For Germany, a partial exposition is found in Cori, *Bau und Einrichtung der deutschen Burg im Mittelalter* (Linz, 1895); Nacher, *Die deutsche Burg* (Berlin, 1885); Essenwein, *Die Kriegsbaukunst* (Darmstadt, 1892); id., *Burgenkunde* (Munich, 1895); Salvisberg, *Die deutsche Kriegsarchitektur* (Stuttgart, 1887). For castles of the Crusades, consult Rey, *Etude sur les monuments de l'architecture militaire des croisés en Syrie* (Paris, 1871), and for England and Scotland, McGibbon and Ross, *Castellated and Domestic Architecture of Scotland from the Twelfth to the Eighteenth Century* (Edinburgh, 1887-92); Clark, *Mediæval Military Architecture* (London, 1884); and Britton, *Architectonical Antiquities*, Vol. III. (London, 1842).

CASTLE, The. Dublin Castle, the seat of the British Government in Ireland. The viceroy and employés of the Government are sometimes slightingly referred to as "The Castle Set" by nationalist sympathizers.

CASTLE, Egerton (1858—). An English novelist, born in London. He was educated at the universities of Paris and Glasgow, at Trinity College, Cambridge, where he took honors in science, and at the Royal Military College, Sandhurst. He served as lieutenant in the Second West India Regiment, and as captain in the Royal Engineer Militia. From 1885 to 1894 he was on the staff of the *Saturday Review*, and is now joint owner of the *Liverpool Mercury*. His novels, several of which have been dramatized, proved popular. Among them are: *Consequences* (1891); *The Light of Scarthey* (1895); *The Pride of Jennico* (1898); *The Bath Comedy* (1899); *Young April* (1899). For Henry Irving he wrote the play *Saviolo*, and for Richard Mansfield *Desperate Remedies*. He has also published two books on fencing and one on bookplates. The third and fourth novels in the list were in collaboration with his wife, Agnes. *The Secret Orchard* (1900) was dramatized for Mr. and Mrs. Kendal (1901).

CASTLE, John Harvard (1830—). An American clergyman. He was born in Philadelphia, and graduated at Lewisburg University, Pa., in 1851. After holding pastorates in the United States and Canada, he became president of McMaster Hall, the celebrated Baptist theological seminary of Toronto (1881).

CASTLEBAR, käs′'l-bär. The capital of Mayo County, Ireland, on the Castlebar River, 159 miles northwest of Dublin (Map: Ireland, B 3). It takes its name from the ancient castle formerly the property of the De Burgh family. It has manufactures of coarse linen and breweries. In the Rebellion of 1641, the English Parliamentary garrison was massacred by the Irish. In 1798 the French, under General Humbert, held the town for a fortnight. Population, 4000.

CASTLE DANGEROUS. A novel by Sir Walter Scott, published in November, 1831, although the introduction printed in later editions was not forwarded from Naples until February, 1832. The scene is laid in the times of Robert Bruce and James, Earl of Douglas, and the plot centres about Douglas Castle, Douglas Dale, Scotland, a fortress which is now a ruin, but which in older days was known as 'Castle Dangerous.'

CASTLEFORD, käs′'l-fẽrd. A town in the West Riding of Yorkshire, England, on the Aire, about 10 miles southeast of Leeds, with which it is connected by rail and canal (Map: England, E 3). Its principal industry is glass-working, in particular the manufacture of bottles. Population, in 1891, 14,100; in 1901, 17,400. Castleford was the Roman Legeolium.

CASTLE GARDEN. A large circular building in Battery Park, at the southern extremity of New York City. Built in 1807, originally as a fort, then 300 yards from the shore, and known as Castle Clinton, it was converted into a garden where civic receptions and other functions were held, whence its name. Subsequently it served as a concert-hall, and in 1855 became a landing-place and temporary headquarters for immigrants. At the close of the year 1890 it was ceded to the municipal authorities; and, under the control of the Park Department, has since been equipped as a large public aquarium, with over one hundred tanks and an admirable collection of fresh-water and salt-water fishes and other aquatic life. Its present interest is overshadowed by its past, for with it are linked in history the names of Lafayette, Presidents Jackson and Tyler, and Jenny Lind. See Aquarium.

CASTLEMAINE, kȧs′'l-mān. A town in the Province of Victoria, Australia, 65 miles north-northwest of Melbourne (Map: Victoria, D 4). Population, in 1891, 6082; in 1901, 5704. It was a place of much importance when gold-mining began, the diggings near by being among the earliest opened. The Victoria Railroad passes through the town.

CASTLE OF INDOLENCE, The. An allegorical and descriptive poem by James Thomson. It was first begun as a humorous autobiographical sketch, but soon outgrew the original conception. The first edition appeared in London, in quarto, 1748; the second, in octavo, in the same year and place. The piece is noteworthy for its revival of the Spenserian stanza and for its effective onomatopœia.

CASTLE OF OTRANTO, ō-trän′tō, The. A 'Gothic' novel by Horace Walpole, published anonymously in December, 1764, but appearing under the author's real name in the second edition. It professed, in the original mock-antiquarian introduction, to be a translation from the Italian. In later editions, however, the author frankly expounded his theory of the interest which a blending of the supernatural with a realistic setting must possess for the average reader.

CASTLE OF SAINT AN′GELO. See Hadrian, Tomb of.

CASTLE PEAK. One of the highest peaks of the Sierra Nevada in California, rising to nearly 13,000 feet above the sea, in latitude 38° 10′ N. and longitude 119° 30′ W., about 25 miles northwest of Mono Lake (Map: California, D 2). The lower slopes are well wooded.

CASTLE RACKRENT. A novel by Maria Edgeworth, published, first anonymously, in 1800, and then under the author's real name. It is an Irish story, the scene of which is laid in the Eighteenth Century, and was doubtless suggested by Miss Edgeworth's visit to Ireland after her father's remarriage. Its principal characters are members of an Irish family on the downward grade. It is, however, interspersed with many humorous passages.

CASTLEREAGH, kȧs′'l-rā′, Viscount. See Stewart, Robert, second Marquis of Londonderry.

CASTLES. In heraldry, castles often figure as charges. The castle appears in the arms of Castile and of many cities—e.g. Bristol, Newcastle, and Carlisle.

CASTLE SPECTRE, The. A play by M. G. Lewis, produced at Drury Lane in 1798, under Sheridan's management. It is an adaptation of an early story of his own, modeled after the 'Gothic' romances of Walpole and Radcliffe.

CASTLETON, kȧs′'l-ton. Formerly a town in Richmond County, N. Y., in the northern portion of Staten Island, now included in the Borough of Richmond, New York City.

CASTLETON. A town in Rutland County, Vt., 11 miles west of Rutland, on Castleton River, and on the Delaware and Hudson Canal Company's Railroad (Map: Vermont, B 7). The valuable slate-quarries in the town constitute the principal industry; there are also manufactures of cheese, plows, and carriages. The town is the seat of a State normal school. Lake Bomoseen, the largest body of water entirely within the State, and an important summer resort, lies almost wholly in the town. The government of Castleton is administered by town meetings, held annually and at special call. Population, in 1890, 2396; in 1900, 2089.

CASTLETOWN, käs'l-toun. The ancient capital of the Isle of Man, situated on the margin of Castletown Bay, near the southern extremity of the island (Map: England, B 2). In its midst rises Castle Rushen, a fortress of great strength, founded by Guthred II. of the Orrys, kings of Man, in 960. It underwent a six months' siege by Robert Bruce in 1313. It is well built, and has a few noteworthy public buildings, its chief educational institution being King William's College, an excellent school for boys.

Being in the neighborhood of the bold coast scenery of the Calf of Man, Spanish Head, etc., Castletown is a favorite resort for the numerous tourists who frequent the Isle of Man. Population, in 1900, about 3000. Consult Fitzgerald, "Castletown and Its Owners," in *Kildare Archæological Journal*, Vol. II. (Dublin, 1898).

CASTLEWOOD, käs'l-wụd, Colonel FRANCIS ESMOND, Lord. The second Lord Castlewood in Thackeray's *Henry Esmond*, the father of Beatrix and Francis. He is a rollicking, hard-drinking spendthrift, who tires of his wife, spoils his children, leads a double life, and is killed in a duel with Lord Mohun.

CASTLEWOOD, LADY. Mother of Beatrix and Francis Esmond and wife of the second Lord Castlewood, in Thackeray's *Henry Esmond*. She becomes spiritually separated from her husband and children by her excessive goodness. At the close of the story she is married again to Henry Esmond, a cousin, who had been brought up in the Castlewood household, and who had been long loved by her in secret.

CAS'TOR, ANTONIUS. A botanist of Rome, in the first century A.D., several times quoted and mentioned by Pliny. He had a botanical garden, probably the earliest on record. He lived more than one hundred years in perfect health, it is reported, both of body and mind.

CASTOR AND POLLUX (Gk. Κάστωρ, *Kastōr*, and Πολυδεύκης, *Polydeukēs*). Twin gods of Greece and Rome, known under the name of Dioscuri (Lat., from Gk. *Διόσκουροι*, *Dioskouroi*, from Διός, *Dios*, of Zeus + κοῦρος, *kouros*, youth)—i.e. children of Zeus and Leda, wife of Tyndareus, to whom the god came in the form of a swan. The Dioscuri were especially reverenced among the Dorians, and their tomb was shown at Amyclæ, near Sparta. The Dorian divinities were later confused with similar twin brothers worshiped in other Greek States, and, in consequence, we find a wide variety of functions ascribed to the Dioscuri. In general, they appear as saviors in time of need, whether in battle or at sea. In art they are usually represented with their horses, as in the fine group on Monte Cavallo in Rome. They often wear an egg-shaped cap in commemoration of their birth from the egg brought forth by Leda, and are frequently crowned with stars and armed with lances. They appear as patrons of athletic sports—Castor of horsemanship and Pollux of boxing. Among their exploits were the invasion of Attica to rescue their sister Helen from Theseus; their part in the Calydonian hunt; their participation in the Argonautic expedition; their abduction of the daughter of Leucippus; and, lastly, their battle with the sons of Aphareus, in which Castor (the mortal brother) was slain by Idas and both the Apharidæ by Pollux. Pollux, who was immortal, was allowed by Zeus to share his immortality with his brother, so that they sojourned one day in Hades and the next in Olympus. This is the version of the *Odyssey*, but later writers give other versions of the way in which this immortality was shared. The astronomical writers identify them with the zodiacal constellation of the Twins. (See GEMINI.) They were greatly venerated in Rome, where it was believed that at the battle of Lake Regillus they fought at the head of the legions of the Commonwealth, and afterwards, with incredible speed, carried to the city the news of the victory. Where they alighted, near a well in the forum, a temple was built, and a great festival held in their honor on the ides of Quintilis, the supposed anniversary of the battle, sacrifices being offered at the public charge. A part of the ceremonies was a grand muster of the equestrian body, when all the knights, clad in purple and crowned with olive, assembled at the Temple of Mars, outside the city, and rode in state to the forum. For centuries this pageant was one of the most splendid sights in Rome. In the days of Dionysius the cavalcade consisted of 5000 horsemen, all persons of wealth and condition.

Castor and Pollux was also the name given by sailors in classic times to an electric meteor, which, under the form of twin balls of fire, attaches itself to the masts of ships, and which was considered to foretell fair weather. When one ball of fire was seen the meteor was called Helena, and foreboded a storm. (See Shakespeare, *Tempest*, Act i., Scene 2.) This appearance is entirely analogous to the brushes of light that tip every sharp metal rod during electric discharges, and which are known in modern times as Saint Elmo's lights (q.v.) or Saint Elmo's fire. It was a favorable omen when the spears of the Roman armies were tipped with these lights. The Portuguese considered them as indicative of the presence of the body of Christ, whence they were called *Corposants* (*corpus sanctus*). Consult Tomlinson, *The Thunderstorm* (London, 1859).

CASTOR AND POLLUX, HOUSE OF. The name given to the ruins of a double house at Pompeii, consisting of two distinct dwellings connected by a peristyle court, ornamented with frescoes.

CASTOR AND POLLUX, TEMPLE OF. A temple on the east side of the Roman Forum, built at the Spring of Juturna, to commemorate the miraculous appearance of the Dioscuri to announce the victory of Lake Regillus in 495 B.C. The temple, of which the three remaining columns are among the most prominent remains in the Forum, was dedicated in 492 B.C., and reconstructed by Tiberius and Drusus in 7 B.C. It was dismantled in 1547 in the search for building material for Saint Peter's. The last excavations, which freed the substructure on three sides, took place in 1871. It was used as a place of deposit for valuable articles and contained the standards of weights and measures.

CASTO′REUM (Lat., Gk. *καστόριον*, *kastorion*, castor, from *κάστωρ*, *kastōr*, beaver). A substance secreted in two paired glandular sacs, closely connected with the organs of reproduction in both sexes of the beaver, and at one time held in high repute in medicine, although now chiefly used by perfumers, when any can be obtained for market from the disappearing animals. It was well known to the ancients. From the time of Hippocrates it was regarded as having a specific influence over the uterus, and was esteemed valuable in hysteria, catalepsy, and other spasmodic diseases. It has always been considered by trappers one of the most powerful of bait scents, under the name 'barkstone.'

CASTOR′IDÆ (Neo-Lat. nom. pl., from Gk. *κάστωρ*, *kastōr*, beaver). The Beaver family. See BEAVER.

CASTOR OIL (so called from its fancied resemblance to castoreum). A fixed oil obtained from the seeds of *Ricinus communis* (Linné), which is cultivated in India. In extracting the oil, the seeds are first bruised between heavy rollers, and then pressed in hempen bags under a hydraulic or screw press. The best variety of oil is thus obtained by pressure in the cold, and is known as *cold-drawn* castor oil; but if the bruised and pressed seeds be afterwards steamed or heated, and again pressed, a second quality of oil is obtained, which is apt to become partially solid or frozen in cold weather. In either case the crude oil is heated with water to 212° F. (100° C.), which coagulates and separates the albumen and other impurities. Exposure to the sun's light bleaches the oil, and this process is resorted to on a large scale. When pure and cold-drawn, castor oil is of a light-yellow color; but when of an inferior quality, it has a greenish, and occasionally a brownish, tinge. It is somewhat thick and viscid. Its specific gravity is high for an oil, being about .960. It is miscible with alcohol and ether. Reduced to a temperature of —15° C. it becomes solid; exposed to the air, it very slowly becomes rancid, then dry and hard, and serves as a connecting link between the drying and non-drying oils. It has a nauseous smell, and an acrid, disagreeable, and sickening taste, which may be overcome by the addition of a little magnesia. The principal acid present in it is ricinoleic acid, $C_{18}H_{34}O_3$, which is allied to oleic acid. It also contains palmitin, stearin, myristin, and an acrid principle.

Castor oil is largely used in medicine and the arts. As a simple purgative it acts in about five hours and empties the large intestines. Its secondary effect is sedative and slightly constipating. It is not suited for continued or repeated use, but should be employed in an emergency, or occasionally, for a single result. It is very useful in diarrhœa due to eating indigestible or irritative substances, in the constipation of alcoholism, as well as of pregnancy, and in inflammatory diseases of the kidneys or of the generative organs. It may be administered in orange-juice, or flavored with oil of bitter almonds, or it may be given in coffee or in soda-water. Pharmacists dispense it in soft, elastic capsules of gelatin, thus obviating the disagreeable smell and taste.

The adulterations of castor oil may be various. Several of the fixed oils, including lard, may be employed. The best test of its purity is its complete solubility in its own volume of alcohol, a test which other fixed oils do not stand. Croton oil is occasionally added to increase the purgative powers of the oil.

CASTOR-OIL PLANT, CASTOR-BEAN, PALMA CHRISTI, *Ricinus communis*. A member of the order Euphorbiaceæ, and a native of tropical Asia and Africa which has become naturalized in most tropical and subtropical countries, and which is cultivated also in temperate climates. In the warmer climates it is a perennial, and occurs as a small tree; but it does not endure frost, and becomes an annual in temperate regions. It was known to the ancient Egyptians, as its seeds have been found in their tombs, and to the Romans, from whom we have the generic name *Ricinus*. There are many distinct forms of the plant, some of which have been described as species, but they are now generally all regarded as varieties of a single species. These forms differ in stature, shape, and color of the leaves, and are very popular for ornamental planting. The leaves are large and broad, from one to two feet or even more in diameter, and palmately cleft. The flowers are unisexual, and both male and female flowers are borne upon the same plant. The fruit is a spiny capsule containing one seed in each of its three divisions. The seeds are oval, from one-third to one-half inch long, and often beautifully variegated. They are chiefly valued for the oil they yield, the common castor oil (q.v.), which is so generally used as a purgative, and which also serves for lighting and lubricating purposes. The plant is cultivated for this oil in the United States, mainly in Kansas, Illinois, and Missouri, and in southern Europe, Asia, South America, the West Indies, and other tropical and warm temperate countries. The pomace which remains after the oil has been extracted from the seed is a valuable nitrogenous fertilizer. For illustration, see Plate of CALABASH, ETC.

CASTRATION (Fr., Lat. *castratio*, from *castrare*, to emasculate; Skt. *śastra*, knife). The removal of the essential organs of generation in animals. In males castration consists in taking away the testicles. In females, castration or spaying consists in removing the ovaries. The purpose of castration is, generally, to make domestic animals more docile and more valuable for meat, as well as to restrict unlimited reproduction. These advantages are counterbalanced, at least in part, by the fact that castration diminishes the powers of endurance and the quickness of the intelligence. Castration may be performed at almost any age, but the effects of it are more pronounced if it is performed before the age of puberty. In surgery, castration is sometimes rendered necessary by disease of the testicle. In the female, the operation is known as oöphorectomy. See EUNUCH.

CASTRÉN, kȧ-strān′, MATTHIAS ALEXANDER (1813-52). An eminent Finnish philologist. He was born at Tervola, December 2, 1813, received his earliest instruction in the town of Tornea, and afterwards studied at Helsingfors. About the year 1838 he undertook a pedestrian excursion through Finnish Lapland, in order to extend his knowledge of the language and literature and in 1840 another through Karelia, to collect ballads, legends, etc., illustrative of Finnish mythology. On his return he published, in Swedish, a translation of the famous Finnish poem, "Kalevala," the metre and style of which were imitated by Longfellow in his poem of "Hiawatha." Aided by the Government of his native province, he commenced his researches among the Finnish, Norwegian, and Russian Laplanders, as also among the European and Siberian Samoyeds. Appointed linguist and ethnographer to the Saint Petersburg Academy, Castrén, between the years 1845 and 1849, prosecuted his laborious investigations as far east as China, and as far north as the Arctic Ocean. On his return he was appointed first professor of the Finnish language and literature at the University of Helsingfors, and in 1851 became chancellor. He employed himself in preparing for publication the vast materials which he had collected, but died May 7, 1852, from exhaustion—a martyr to science. Before his death appeared *Versuch einer ostjakischen Sprachlehre nebst kurzem Wörterverzeichnis* (1849), as the first instalment of his *Northern Travels and Researches*. He also wrote: *Elementa Grammatico Syrjaenæ* (1844), and *Elementa Grammatices Tscheremissæ* (1844); *On the Influence of the Accent in the Lappish Language* (1845); *De Affixis Personalibus Linguarum Altaicarum* (1850). An edition of his works in Swedish, in five volumes, appeared 1852-58, and a German translation was published later.

CASTRES, käs'tr'. A town of France, in the Department of Tarn, situated in the fertile valley on both sides of the river Agout, 16 miles east of Toulouse (Map: France, J 8). The two parts of the town are united by stone bridges. The principal features are the cathedral, the seminary, the communal college, the public library, and the artillery school. Castres has beautiful promenades, shaded by fine alleys of trees. It is a busy manufacturing place. Its fine dyed-wool goods are especially famous, and it has also manufactures of silk, linen, leather, paper, soap, etc. Population, in 1901, of town, 19,483; of commune, 27,308. In the Middle Ages Castres was celebrated for its Benedictine Abbey, the heads of which ruled the city. It was one of the first French towns to adopt Calvinistic doctrines, and is the seat of a Protestant Consistory. It suffered heavily during the religious wars of the Sixteenth Century, and in 1629 Louis XIII. razed its fortifications.

CASTRI, kä'strē, or **KASTRI**. A village of modern Greece, in the Nome of Phocis, situated on the southern declivity of Mount Parnassus, and worthy of notice as formerly occupying a portion of the site of the ancient Delphi (q.v.). In consequence of the purchase of the site by the French for the purpose of excavation, the inhabitants moved in 1893 to the new village somewhat to the west of the ancient city.

CASTRIES, kȧ'strē', or Port Castries. The capital of the island of Saint Lucia, West Indies (Map: West Indies, R 8). It is situated on the west coast, on Carenage Bay, the entrance to which is marked by a lighthouse visible 14 miles. Most of the trade of Saint Lucia (q.v.) is carried on through this port. Population, in 1901, 7910.

CASTRIOTA, käs'trê-ō'tȧ, George. See Scanderbeg.

CASTRO, kä'strō, Guillen de (1569-1631). A Spanish dramatist who enjoyed the friendship of Lope de Vega, whom he assisted in the famous festival of the canonization of San Isidoro, where he won a prize in the literary tournament. Castro wrote about forty plays, the most celebrated of which was *Las mocedades del Cid*, to which Corneille was greatly indebted for the materials of his renowned tragedy. It is said that Castro died in poverty, and was buried by charitable friends.

CASTRO, Inez de (? -1355). A Spanish noblewoman whose unhappy fate has been made the subject of tragedies and poems. She was the daughter of Pedro Fernandez de Castro, a descendant of the royal family of Castile. After 1340 Inez lived with her cousin, Constantia, the betrothed wife of Dom Pedro, son of Alfonso IV. of Portugal. Constantia died in 1345, and Dom Pedro, as she afterwards claimed, secretly married Inez, in the presence of the Archbishop of Guarda. As the King feared that this union might prove injurious to the claims of Ferdinand, son of the deceased Constantia, it was determined in the King's Council that Inez must die. Accordingly, three Portuguese knights hastened to Coimbra and executed the sentence (1355). Dom Pedro attempted a revolt against his father, but finally became reconciled. Two years later Alfonso died, and the murderers of Inez left Portugal and sought shelter with Pedro the Cruel of Castile. Pedro proposed to the young King of Portugal an exchange of fugitives, and the latter consented. One of the three assassins escaped through the kindness of a beggar, but the other two were tortured in the presence of King Pedro at Santarem (1360). According to a tradition, immortalized by Camoens, Pedro established the legality of his marriage with Inez, caused her body to be exhumed, and, placing it upon the throne, required all the nobles to do her homage. Inez's body was interred at Alcobaça, and a fine marble monument was erected over the grave, surmounted by her statue, wearing a crown.

CASTRO, João de (1500-48). A Portuguese naval commander and explorer. He was born in Lisbon, and as a youth distinguished himself in a number of campaigns against the Moors of Tangiers and Tunis. Upon his return from an expedition to the Red Sea, he was made, in 1543, commander of a fleet to clear the European seas of pirates. In 1545 he was sent out as viceroy of the Indies to supplant Martin de Souzo. Valiantly seconded by his two sons, he overthrew Mahmud, King of Cambodia, relieved the beleaguered town of Diu, and defeated the great army of Adhel Khan. He subsequently completed the subjugation of Malacca, and prepared the way for the invasion of Ceylon. The unceasing warfare he carried on against kings and rajahs wore him out before his time. Shortly after receiving his full commission as viceroy he died, at Ormus. He wrote a description of the Red Sea entitled the *Roteiro*, which was very important for his day (latest edition by Corvo, Lisbon, 1882). Consult Andrada, *Vida de Dom João de Castro* (Lisbon, 1651).

CASTRO, José María (1818—). A statesman of Costa Rica, born in San José. He graduated at the University of León, Nicaragua. He was President of Costa Rica from 1847 to 1849, and from 1866 to 1868, when he was superseded by Jimenez. He held the rank of a general of division, and bore the title 'Founder of the Republic of Costa Rica.'

CASTRO ANDRADE Y PORTUGAL, än-drä'dȧ ē pōr'too-gäl'. Pedro Antonio Fernandez de, Count of Lemos (1634-72). A viceroy of Peru. He was appointed to succeed Diego Benavides y de la Cueva, and entered upon his office on November 21, 1667. The lawlessness in the mining regions he met with severity. Particularly was this true in connection with the silver-mine of one Gaspar de Salcedo at Laycacota, near Lake Titicaca. The enormous revenues derived by Salcedo from this mine angered other mining proprietors of the district. Bushwhacking bands were formed, and blood flowed freely. The viceroy opened at Pancar-colla a court for the trial of such offenses, executed forty-two persons, and banished or fined many more. Having been assured by his confessor, Francisco del Castillo, that he had been needlessly cruel, he had masses said for the souls of his victims, and himself performed menial duties in the conduct of the services.

CASTRO DEL RIO, kä'strō dĕl rē'ō (Sp., castle of the river). A town of Spain, in the Province of Cordova, situated on the right bank of the Guadajoz, about 21 miles southeast by south of Cordova (Map: Spain, C 4). A portion of the old town is surrounded by ruined walls. The new town, lying outside of these, has some good streets. The municipal building is worthy of mention. The town has manufactures of woolen and linen fabrics, earthenware, etc., and carries on considerable trade in agricultural produce. Population, in 1900, 11,689.

CASTROGIOVANNI, kä'strō-jō-vän'nē (It., castle of John). A city in the centre of Sicily, 55 miles west of Catania (Map: Italy, J 10). It is delightfully situated on the level top of a hill 2600 feet high, built in the form of a horseshoe that opens toward the east. The town is cool in summer and often very cold in winter. The main street leads up to the ancient citadel, La Rocca, repaired by King Manfred, from the highest tower of which is obtained one of the finest views in Sicily. On the east rises the pyramid of Etna, on the north and west are magnificent mountain ranges, and on the south are visible more mountains and the sea. The cathedral, founded in 1307, has some treasures, and the public library contains valuable incunabula. There are also a museum, a technical institute, and a castle built by Frederick II. of Aragon. The city is a local centre of trade, mainly in sulphur and rock salt. It occupies the site of the ancient Enna, called *inexpugnabilis* by Livy, and the modern name comes through the Arabic Kasr-Yani, the Yani being an Arabic corruption of Enna. Near it is Lake Pergusa, with which is associated the story of Proserpina and Pluto. In the Punic Wars Enna was a centre of combat, and ancient Roman missiles are still picked up in the vicinity. In A.D. 837 its walls defended the inhabitants of the whole district against the Saracens, but in 859 the fortress was captured by treachery. The Normans captured it in 1087. Population, in 1881 (commune), 19,000; in 1901, 26,081.

CASTRO-URDIALES, -oor'dē-ä'lās. A town of Spain, in the Province of Santander, situated on the Bay of Biscay (Map: Spain, D 1). It has a good roadstead, and exports timber and fish to Madrid. Fishing and fish-preserving, with some manufactures, constitute the principal industries. Castro-Urdiales, an ancient port, was a Roman colony, Flaviobriga, under Vespasian; in 1173 it was resettled. The town, after having repelled a previous attack, was sacked by the French in 1813. Population, in 1900, 13,068.

CASTROVILLARI, kä'strō-vēl-lä'rē. A city in southern Italy, 34 miles north of Cosenza, on two brooks that unite to form the Coscile (Map: Italy, K 8). The ancient part of the town, about the Norman castle, is not inhabited because of malaria. There are many picturesque mountain roads in the vicinity, particularly one that leads to the salt-mines at Lungro. Fruit, wine, and cotton are marketed here. Population, in 1881 (commune), 11,000; in 1901, 9945.

CASTRUCCIO CASTRACANI, kȧ-stroo'chō kä'strȧ-kä'nē (c.1280-1328). An Italian soldier and Ghibelline leader, chief of the republic of Lucca. A member of a prominent Ghibelline family of Lucca, he was exiled at an early age, and served as a soldier in England, France, and Lombardy until 1313, when he returned to Lucca. Being placed at the head of his State, he played a prominent rôle in the struggle between the Ghibellines and Guelphs in Tuscany. He supported the German Emperor, Louis the Bavarian, whom he accompanied on his expedition to Rome in 1327, and who made him Duke of Lucca, Count of the Lateran Palace, and Senator of Rome.

CAST STEEL. See Iron and Steel, Metallurgy of.

CASTUA, kä'stwȧ. A town in the Austrian Crownland of Istria, at the head of the Bay of Quarnero, near Fiume (Map: Austria, D 4). Population, in 1890 (commune), 16,500; in 1900, 18,000, mostly Serbo-Croatian. Castua is a very old town, and was at one time the capital of Liburnia.

CASUAL POOR. A term used in the administration of the English Poor Law to indicate persons temporarily relieved without being admitted to the roll of permanent paupers. See Poor Laws.

CASUARINA, kăzh'ṳ-ȧ-rī'nȧ (Neo-Lat., from *casuarius*, cassowary, from Dutch *kasuaar*, Malay *kassuwaris*, so called from the resemblance of the branches to the feathers of the bird). A genus of the order Casuarinaceæ. The trees of this genus are almost exclusively Australian. However, *Casuarina equisetifolia* is found in the South Sea Islands, the Indian Archipelago, the Malayan Peninsula, and on the east side of the Bay of Bengal, as far north as Arracan, and *Casuarina Sumatrana* grows in the Philippine Islands. Some of them are large trees, producing timber of excellent quality, hard and heavy, as the beefwood of the Australian colonists, so called from the resemblance in color to raw beef. *Casuarina equisetifolia* is called in Australia the swamp-oak. It is a lofty tree, attaining a height of 150 feet, the *toa* or *aitoa* of the Society Islands, where it grows chiefly on the sides of hills, and where its wood was formerly used for clubs and other implements of war. It has been introduced into India, where it grows rapidly upon even poor, sandy soil, and where it is much valued, as its wood bears a great strain and is not readily injured by submersion in water. The hardness and durability of this wood led the earlier voyagers to the South Sea Islands to designate it ironwood. *Casuarina stricta* is the 'coast she-oak' of New South Wales. In Australia, where the Casuarinas abound, they are considered among the most valuable trees. For the most part, the wood is hard, compact, yet easily worked, and is used in many kinds of building, for implements, cabinet-work, etc. The foliage of most, if not all, species is of an acid nature, and is often chewed to allay thirst. In periods of drought stock eat considerable quantities of the foliage. The first-mentioned species has been quite successfully introduced into parts of Florida and California. 'Cassowary-tree' is a popular generic name of the Casuarinas. Some of the species are scrubby bushes. All of them have a very peculiar appearance, their branches being long, slender, wiry, drooping, green, and jointed, with very small, scale-like sheaths instead of leaves. They resemble arborescent equisetums, or horse-tail rushes. The fruit consists of hardened bracts, collected in a cone and inclosing small winged nuts. The flowers have neither calyx nor corolla; the stamens and pistils are on separate flowers. More than twenty species are known.

CASUISTRY, kăzh'ŭ-ĭs-trī (from *casuist*, Fr. *casuiste*, from Lat. *casus*, instance). The science which guides the human conscience in the fulfillment of its duties. As doubts occur, either as to the reality or extent or urgency of the laws by which it is governed, 'cases' come up which have to be judged. That part of theology which deals with such matters is called moral theology. Casuistry developed as circumstances called for new and clearer interpretations of divine and human enactments. In the first centuries it was extremely simple, and the treatises on it consisted mainly of conciliar decrees, or collections of penitential canons such as those attributed to Saint Gregory Thaumaturgus, Saint Peter of Alexandria, Saint Basil, and Saint Gregory of Nyssa. From the Seventh to the Eleventh Century the work known as *The Penitential Book*, which was a digest of canons, sentences, and decrees, was the manual commonly used. But moral theology proper began with the Schoolmen of the Thirteenth Century. The most noteworthy of the treatises then written was the *Summa de Casibus Particularibus* (c.1238), of Saint Raymond of Peñaforte. Other conspicuous casuists of the century were the Englishman Alexander of Hales, Vincent of Beauvais, and John of God. In the Fourteenth Century we have John of Freiburg, Astensis, Monaldus, Bartholomaeus, Ranulphus Higdenus, and, most famous of all, Joannes de Burgo. In the Fifteenth Century, Gerson's famous *Opusculum Tripartitum* enjoyed the greatest reputation. Saint Bernardine of Sienna, Saint John Capistran, and Saint Antoninus also wrote on moral subjects. But the one who has exercised the widest influence is, of course, Saint Thomas Aquinas, who in his *Secunda Secundæ* treats of moral theology in its organic connection with dogma. Its strictly scientific character, however, makes it somewhat unavailable as a manual for common use. Making this science practical was the achievement of the Sixteenth Century. The extraordinary development of this particular branch of theological knowledge was largely due to the doctrine of Probabilism.

This was not a new doctrine, but it was inaugurated as a system by a Spanish Dominican named Medina. The theory may be thus stated: A man in doubt about the lawfulness of an act has solid reasons for thinking it is lawful. These reasons may be intrinsic to the matter itself, or extrinsic, namely, the authority of some respectable theologian. But there may be contrary reasons of equal or greater weight than those in favor of it. Which course is he to elect? Probabilism teaches that he is free to do as he chooses, provided his reasons for acting be genuine and solid. He proceeds on the principle that as the law is not certain, either as to its existence or its binding force, he is free; for no one is bound by a doubtful obligation. This liberty, however, is restricted if for some major obligation he is bound to take every reasonable means to achieve a certain object. A hunter cannot discharge his rifle where it is merely probable no one will be hit; he must take every reasonable precaution; a Catholic priest cannot act on the doctrine of probability where there is question of the validity of a sacrament. But apart from these antecedent obligations of justice, charity, and religion, Probabilism leaves a man free when he has good reasons for judging that he is doing right.

Against this doctrine four schools were arrayed: the Tutiorists or Rigorists, who were either absolute or mitigated, the former requiring absolute certainty, the latter the greatest probability; the Probabiliorists, who taught that in cases of doubt a man should always follow the safer course; the Equiprobabilists, who allowed liberty of action only when the reasons *pro* and *con* were evenly balanced, but modified that concession by saying that when the existence of the law was certain or even more probable, there could be no liberty against it, for the law being certainly or more probably in possession exacted fulfillment; the Laxists, who contended that one is free to act if he has even a slight reason to conclude that he is in the right. The Laxists were condemned by Innocent XI., and the Absolute Tutiorists by Alexander VII.

On these lines a fierce and protracted theological battle began, which finally narrowed down to a contest between the Probabiliorists and the Probabilists. From 1580 to 1650 Probabilism held possession. After that a reaction set in, and Probabiliorism was the favorite doctrine. At present the conditions have reverted to what they were in the beginning, and Probabilism almost everywhere prevails in the Roman Catholic Church. The chief exponents are Saint Alphonsus Liguori, Scavini, Gury, and Ballerini.

The acrimony of these debates gave rise to the odious significations which have been affixed to the word Casuistry. After the accusations of the Jansenists (see PASCAL; JANSENISM) ceased about the middle of the Eighteenth Century, many Protestant writers took them up and denounced the casuistry of Probabilism as lax, equivocating, permitting the most detestable crimes, and outraging the most sacred obligations. These charges, no longer seriously made by intelligent students, have given rise to the secondary meaning of the word Casuistry as, according to some, a method of over-subtle, sophistical, and dishonest reasoning for the purpose of evading the law; others regard it as an elimination of individual reason and conscience, and a blind submission to authority.

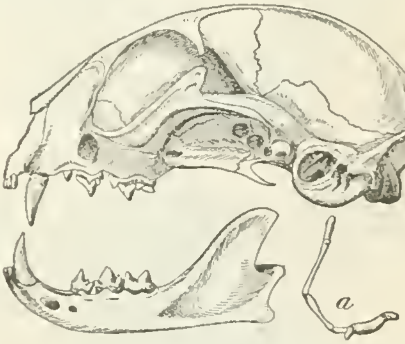
CA'SUS BEL'LI (Lat., case of war). The ground alleged by one power to justify its going to war with another. The grounds which, in international law, are recognized as affording a justification for war are: (a) The defense of the sovereignty and independence of the State; (b) the redress of grave injuries inflicted by a foreign power on the citizens of a State; (c) to obtain satisfaction for violations of the honor of a State, as for insults to its flag or its ambassadors; (d) the enforcement in serious cases of treaty obligations; (e) the prevention of threatened or intended injury, as a sudden disturbance of the balance of power in Europe, or the disregard by a European power of the Monroe Doctrine of the United States; (f) in rare cases, the prevention of flagrant wrong against religion or liberty, or grave oppression of a colony or weaker State, as in the war of the United States against Spain for the liberation of Cuba. (See INTERVENTION.) The humane tendencies of modern international law seek to restrict the causes for war, and by moral pressure to induce an offended State patiently to seek every other means of effecting its object before resorting to the dire expedient of war. See ACTS OF HOSTILITY; INTERNATIONAL LAW; HAGUE PEACE CONFERENCE; WAR, and the authorities there referred to.

CASWELL, kăz'wel, ALEXIS (1799-1877). An American educator. He was born in Taunton, Mass., graduated at Brown University in 1822, and entered the Baptist ministry. He was professor of mathematics in Brown University from 1828 to 1850, and of mathematics and astronomy from 1850 to 1864, and was president from 1868 to 1872. He published several papers on meteorology in the *Reports of the Smithsonian Institution*, and a *Memorial of John Barstow* (1864).

CASWELL, RICHARD (1729-89). A patriot soldier of the American Revolution, and the first Governor of the State of North Carolina. He was born in Maryland, emigrated to North Carolina in 1746, studied and practiced law, and soon became prominent in Colonial politics. He was a member of the Colonial Assembly from 1754 to 1771, and was elected Speaker of the House of Commons in 1770 and 1771. He also attained prominence as an officer in the Colonial militia, and on May 16, 1771, commanded the right wing of Governor Tryon's forces in the battle of Alamance against the insurrectionary Regulators. He was active as a member of the Whig, or Patriot, Party in the discussions which preceded the Revolution, and in 1774 and 1775 was a delegate to the Continental Congress. In September, 1775, he was appointed one of the treasurers of North Carolina. He commanded the minutemen, numbering about 1000, who, on February 27, 1776, defeated a force of Loyalists, mostly Scotch emigrants, under Donald Macdonald, at Moore's Creek, N. C.; and for this victory, the effect of which, says Fiske, "was as contagious as that of Lexington had been in New England" (Fiske, *The American Revolution*, I., 177), he was appointed brigadier-general of the Newbern District. In 1776 he was a member of the committee of the Provincial Congress which drew up the State Constitution—one tradition attributing the authorship of that document altogether to him—and from 1776 to 1778 he served as Governor. In 1780 he commanded the North Carolina militia during the invasion of the State by the British, and took part in the battle of Camden on August 16. He afterwards served as Speaker of the State Senate and Controller-General from 1782 to 1785, and as Governor, for a second term, from 1785 to 1787, and in 1789 was a member of the State convention which ratified the Federal Constitution.

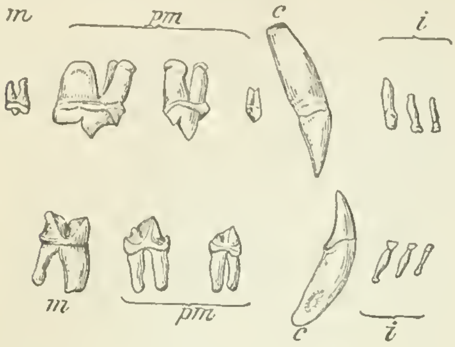
CAT (AS. *catt*, Ger. *Katze*, Fr. *chat*, OF. *cat*, It. *gatto*, Sp., Portug. *gato*, Welsh *cath*, Corn. *cath*, Ir., Gael. *cat*, OChurch Slav. *kotelĭ*, O. Pruss. *catto*, cat, Lat. *catus*, cub; borrowed in Finn. *katti*, Turk. *qadi*, Ar. *qitt*, *qutt*, Hind. *katās*; of uncertain origin). The cats are typical æluroid carnivores, constituting the family Felidæ, and well represented by the ubiquitous house-cat, which is considered at length below.

Cats in general, as a family, are distinguished among carnivores by their uniformity of structure, by the flexibility and strength of the spine, the small head, capable of being turned in any direction, the looseness of the skin, and the exceeding suppleness, quickness, and muscularity, the last especially exhibited in the jaws and in the wonderful arrangement of levers in the limbs. These are correlated with their predatory habits, and manner of procuring their prey, which is by lying in wait, or by stealthy approach, followed by a spring, a clutch of the claws, and a crushing bite. All the anatomy, therefore, represents agility and power in the highest degree; and all cats except two or three of the heaviest (lion, tiger) are arboreal to a greater or less degree. The skull is remarkable for the bony ridges which give attachment to the great jaw-muscles, the immense size of which causes a corresponding increase in the width of the zygomatic arches; and the facial portion, short in all carnivora as compared with herbivora, is here much shorter than in the dog or bear tribes, giving the characteristic roundness to the head. The lower jaw is strongly attached, and capable only of a simple hinge-like motion. The dentition consists of six small incisors in each jaw, large canines, and one permanent molar on each side, that in the upper jaw being small, the lower large and acting against the fully developed premolar in the upper. All



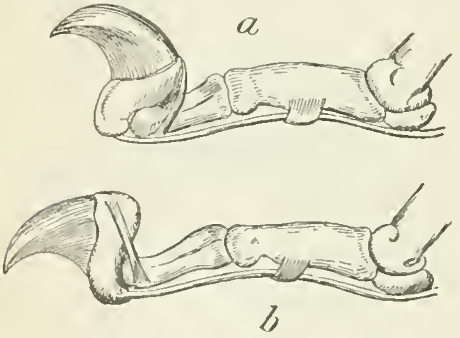
SKULL OF CAT.
a, Tongue-bones of one side.

are carnassial, for little 'grinding' of the food is called for; and the canines of some, as especially of the extinct sabre-toothed tiger, are formidable tusks. The tongue is rough; the intestinal canal very short, being in some species only three times the length of the body. The most striking and characteristic peculiarity of cat-structure, however (though imperfect in one genus—Cynælurus; see CHEETA), is the arrangement for the protrusion and retraction of the claws, by which they are made the principal instruments whereby these creatures get their living. Their plan, as has been said, is to get as near as possible to their animal prey, seize and hold it until they can overcome it by biting through the arteries of the neck (in the case of large quadrupeds) or otherwise put it to death; they cannot chase it down and worry it to death after the manner of dogs. This requires that their toes should be separated, flexible, and capable of a powerful grip, and their claws sharp and hooked. The acquirement of such tools has been accompanied by provision for keeping them out of the animal's way, in the ordinary use of its feet, and at the same time saving them from becoming blunted by contact with the ground, as happens to those of all other clawed animals, by a peculiar arrangement. In the cats, the last (third) phalanx, or tip-bone, of the toe, which carries the claw, does not touch the ground, but it is so modified as to turn up beneath a hood of skin over the end of the bone (second phalanx) next behind it; this it does naturally, when at rest, by virtue of the elasticity of a ligament which passes from it down to the second phalanx, and holds it in place without any conscious effort. From the lower (proximal) end of this claw-bone a powerful flexor tendon runs back beneath the bones of the toe to the leg-muscles, the contraction of which pulls the claw down with a circular motion which drives it and hooks it into the flesh, where it will tear loose before it will let go. Such is the mechanism of the action so familiar and effective in the cat when she is angry and 'shows her claws.' The cheeta (q.v.) lacks this power, and correspondingly its predatory habits partake of much that characterizes dogs.



DENTITION OF THE CAT.

Teeth of left side in both jaws: *m m*, molars; *pm pm*, pre-molars; *c c*, canines; *i i*, incisors.



MECHANISM OF CAT'S CLAWS.

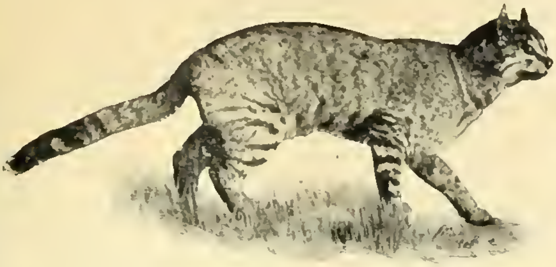
a, Toe at rest (claw sheathed); *b*, toe in action (claw thrown forward). The illustration shows the elastic ligament which passes from above the root of the claw downward and backward to the distal part of the second phalanx; also the long flexor tendon (which by being pulled backward draws down the claw) passing through the ligamentous loop attached to the under surface of the middle phalanx. The sesamoid bone beneath the distal end of the metacarpal is also shown. (After Mivart.)

Cats are mainly nocturnal in their habits, and the pupils of their eyes, which, as a rule, are vertically linear, are capable of great expansion and contraction, according to the light about them; the lion, however, by virtue of his fearlessness and circumstances generally, is mainly diurnal and has round pupils. The eyesight is good, but at night is supplemented by the highly sensitive feelers (vibrissæ), long hairs projecting from the muzzle and above the eyes, each springing from a follicle from which a special nerve communicates with the brain. The sense of smell, though fairly developed, is inferior to that of dogs and various other animals. The hearing, however, is exceedingly sharp, the resonance of the sound being increased by the great size of the auditory bulla.

Cats are clothed in soft and usually rather long fur, longest in those, such as the ounce, which live in cold regions, and shortest in the desert species, especially the lion, which is further distinguished by a mane in the male sex. Little difference, as a rule, obtains between the sexes in size or appearance; but the kittens are often quite unlike their parents. Their pelts have never entered largely into the fur trade, however, except in the form of tiger-skin floor-rugs, etc. The colors are mainly dark, with a prevalence of reddish or yellowish, and there is a universal and strong tendency toward spottedness (of which striping is another form), the young showing it even where the adult is concolorous, as in the lion, puma, eyra, etc. Arguments have been freely adduced for the value of this coloration in making the cats unnoticeable, but when it is learned that species almost oppositely colored and marked live and hunt under identical circumstances with apparently equal success, the force of the speculation is seriously diminished.

Cats are not gregarious, or coöperative, but live and hunt alone, or in family parties; all are monogamous except the lion; and the reputation which some have for permanent mating is probably deserved only when an annual change of mate is impracticable because of scarcity or competition. They inhabit dens and lairs among rocks, in hollow trees, or dense thickets, without any special preparation, and the number of kittens does not usually exceed two in the large forms, but in the small species may be three, four, or five. These are usually born in the late spring of temperate latitudes or at the

CATS



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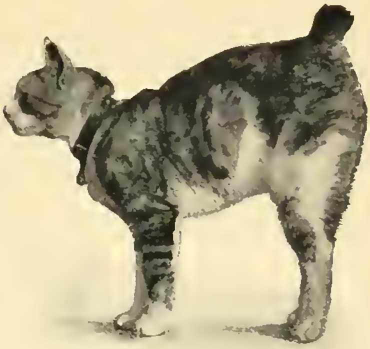

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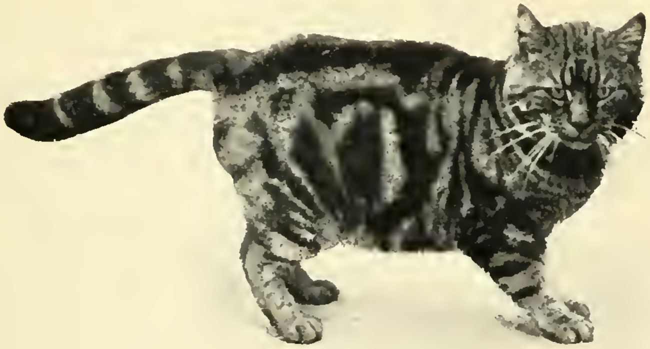

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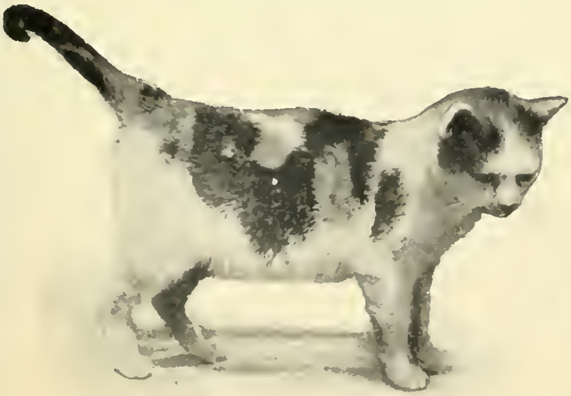

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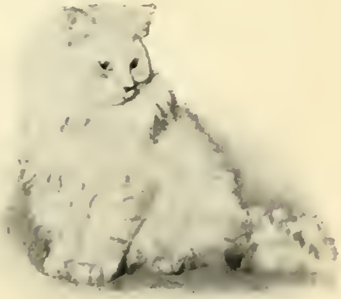

5

1. EGYPTIAN OR CAFFRE CAT.
2. MANX CAT.
3. TORTOISE SHELL CAT.
4. BROWN TABBY CAT.
5. LONG-HAIRED, SILVER-HAIRED, OR ANGORA CAT.

opening of the dry season in the tropics; and they remain under the guidance of the mother until nearly full-grown. Though many species are widely distributed, none are migratory, and few wander far, the tiger and leopard being the most inclined, perhaps, to wide ranging. The disposition of most cats is to remain near a settled lair, and through a limited area near by—a disposition recognizable in the attachment to the house and to a favorite corner that distinguishes our house-cats, and makes them loath to change their location and customs. A certain inflexibility seems to characterize their minds, and the secrecy, noiseless stealth, patience, and ruthlessness which belong to their methods of life in the forest have affected their temperaments. The needful savagery of their nature is ingrained and as a rule unyielding to gentler influences in changed conditions. Hence they are, as a class, untamable, the very few exceptions having become the stock of the domesticated races. Most species can be made friendly to man only when kittens, asserting their feral natures and becoming untrustworthy as soon as growth brings sense of power and predaceous instincts. Trainers have subjugated certain species, but they are kept in subjection by fear alone and make their performance unwillingly and without pride or joy in it. A few have been trained to hunt, but none to retrieve, and in general they approach sympathy with man and the attitude of companion and helper far less than dogs, which exceed them in certain directions of intelligence, as, for example, the understanding of mechanical appliances. A cat's expression of its emotions is mainly by 'lashing' of the tail or a trembling of its tip, when excited; by spitting, yowls, and screams when very angry, or sexually excited; by plaintive mewings when in trouble or desiring notice; and by a vibrating murmur deep in its throat (purring) when satisfied or contented. The position of the ears is very significant, as in most other animals; and the arching of the back, erection of the hair, and elevation of the tail, so familiar in our house-cats, which thus try to make themselves look as large and terrible as possible in the presence of an enemy, are characteristic of all the smaller forms, though little indulged by the greater kinds. The relation of the cats to mankind generally is one of enmity—they are neighbors dangerous to him or his domestic animals which must be got rid of wherever civilization is to prevail. Hence they have mostly disappeared from thickly settled regions. The lion and tiger were inhabitants of Europe within historic times, but neither is now to be found near the Mediterranean on either side; and even the wildcat is rare in Europe, except in wilder parts. The puma has been exterminated in the United States east of the Plains, and lynxes are uncommon, while the jaguar has quite disappeared north of Central Mexico. In certain long-settled parts, however, jungles and mountain ranges furnish harbors for these beasts, which sally out to destroy human life, as in India and Africa, or to prey upon flocks and herds as in America.

Fossil Cats.—The Felidæ seem to have been derived from somewhat primitive Miocene carnivores, the sabre-toothed tigers (q.v.) constituting the highly interesting family Nimravidæ, which were themselves evolved from some earlier Eocene creodonts, perhaps Palæonictis and Patriofelis (q.v.).

The true felines appear first in the Lower Miocene of France, where they are represented by Proælurus, and in the Middle Miocene by Pseudælurus. The genus Felis appears first in the Middle and Upper Miocene of Europe and North America, and later in the Pliocene and Pleistocene of both these continents and also of Asia. As with several other races of animals, the Pliocene and Pleistocene members appear to have been of much larger size and to have inhabited more northerly countries than their modern descendants. The cave lion (*Felis spelæa*), whose remains are found in the cave deposits of Europe and England, was larger than the modern lion of Asia and Africa, of which species it seems to have been but a variety. Equally large species are known from the American Pleistocene deposits. Fossil remains of many of the existing species of felines are found in the Pleistocene deposits of Europe and southern Asia.

Cats inhabit all parts of the world except Australia, New Zealand, southeast Malaysia, the Polynesian Islands, and Madagascar, the greater number being inhabitants of southern Asia. There are from 40 to 50 species (according to various views of specific rank in certain cases), divided by conservative zoölogists into only three genera—*Felis*, with 35 to 40 species; *Lyncus*, the short-tailed cats, 6 species; and *Cynælurus*, 1 or perhaps 2 species. Most of these will be found described elsewhere under their names, as Leopard, Lion, Lynx, Ounce, Tiger, etc., or under Wildcat.

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The Domestic Cat.—A cat, or cats, formed a part of the domestic circle in various parts of the world before the beginning of human record, and the question of the origin of the varied domestic races known within historic times may only be guessed at. Naturalists have attempted by a study of semi-fossil remains, mummies from ancient Egyptian tombs, a comparison of modern examples with wild forms of similar size, and a study of the reversionary tendencies exhibited by house-cats that return to a feral life, to determine the origin of the race, but have learned nothing definite. The best opinion seems to be that stated by J. E. Harting, F.L.S.: "Several wild species of Egyptian and Indian origin having been ages ago reclaimed, the interbreeding of their offspring and crossing with other wild species in the countries to which they have been at various times exported has resulted in the gradual production of the many varieties, so different in shape and color, with which we are now familiar."

Domesticated cats seem to have been common in Egypt before the time of the earliest records, for their mummies are coeval with the most ancient human remains and they are depicted on the oldest monuments. The same may, perhaps, be said of India, where they are mentioned in Sanskrit manuscripts at least 2000 years before Christ; and from India they were taken to China, where, however, they seem not to have been generally known until about A.D. 500. It was in Egypt, however, that the animal, which is considered to have been there, at least, the local gloved or Caffre cat (*Felis caffra*) domesticated, reached its highest importance, both as a mouser in that 'granary of the world,' and as an object of affection and veneration. It was naturally connected with the cat-headed moon-goddess Pasht, both by its habits and by the fanciful resemblance of the gradual expansion of its pupil, as darkness came on, to the growth of the moon; was protected by priestly decrees and superstitions of great popular force, and was entombed in elaborate mummy-cases. It is believed that the domestic cats of Europe, whence America received its stock, were derived from Egypt at a comparatively late day. It does not appear that they were known as domestic animals among the Assyrians or early Hebrews, and the mousers in the homes of the early classic Greeks were probably martens (*Martes foina*). Cats were possessed by the central Europeans of the Bronze Age, and probably came to have more or less admixture with the European wildcats, but the basis of the stock from which our present varieties have descended is, no doubt, the Egyptian domesticated race. The Indian and Chinese may have originated quite separately from Asiatic species.

Domestic cats are now divided by the character and color of the coat, comparative length of tail, etc., into certain varieties recognized by fanciers, according to rules formulated by the societies which hold annual competitive exhibitions in New York, London, and other cities. The principal divisions are two—long-haired, or Asiatic, and short-haired, or European cats. The long-haired varieties are two, the Angora and Persian.

The *Angora* cat came originally from Angora, and has a small head and rather large tufted ears; the long silky hair should hang in tufts and clusters, shortening toward the end of the tail. The colors are varied, but black and dark-slate colored ones with orange eyes, or blues and whites with light eyes, are most valued.

The *Persian* is also long-haired, but is larger in body and the fur is coarser, and increases toward the end of the long tail; the color may be almost any, but deep black with orange eyes is preferred; blue is the next best color.

The short-haired cats are mainly distinguished by their colors, as tortoise-shell, tabby, white, blue (or Maltese), etc. The hair may differ somewhat in length and texture, but in this respect the diversities are too slight and inconstant to count much. *Tortoise-shell* cats are rather small, long-bodied, and graceful; in color, black, red, and yellow, rich and deep, and disposed in sharply defined patches upon short, close, silky hair. Eyes, bright amber to orange-yellow. The presence of white sets the animal aside into a variety known as *Tortoise-shell and White*, where the white should be in a distinct blaze on the face and on the breast and legs. All these cats are good mousers, but less affectionate than some others.

Tabby is the name given to banded or brindled cats, in allusion to the wavy pattern of their coats, like the old-fashioned 'watered' fabrics from the East once known in commerce as 'atabi' and more lately as 'taffety.' Four varieties are recognized by fanciers—brown, spotted, blue (or silver), and red tabbies. Good examples of these types must conform to their standard; anything else is simply an unclassed 'tabby-cat.' "The brown tabby," says Huidekoper, "has a ground color of a rich reddish dark brown, with no white, and even, regular bars and bands of solid shining black over every part of the body; these bands must be perfectly distinct, and there must be no spots." The *Spotted Tabby* may be of any base color, and is uniformly and equally spotted all over with black spots set in lines. The eyes of both these varieties should be orange. The *Blue* or *Silver Tabby* is a rather small, very slender, graceful, close-haired cat, bright blue or else silvery in color, setting off the jet-black narrow bands with great sharpness; cushion of the feet black; long tail, ringed; eyes orange for the blue, yellow for the silver race. The *Red Tabby* varies from reddish brown to red in base color, having well-defined bands of darker red, and no white whatever; eyes, orange or yellow. This cat is an important factor in breeding tortoise-shells; in fact, 99 per cent. of male tortoise-shell kittens are red tabbies, the females only, as a rule, being proper tortoise-shells. They are good-natured domestic cats, great mousers and hunters for birds; they are also expert fishers. *White* and short-haired cats form a special class, characterized by eyes of turquoise or clear sky-blue; or, if yellow, there must be no greenish tinge. These are quiet, affectionate cats, very often deaf. *Self-Colored* cats include those which are of some one solid color, and their eyes should be orange-yellow for the blue (or Maltese, as it is known in America), orange for the black, yellow for the gray, and gold for the red cat. The more uniform the color the better. *Black* cats and *Black-and-White* cats are classed separately, and in the latter case the white should be only on the face, muzzle, breast, and paws; the eyes vary from orange-yellow to 'sea-green.' The *royal cat of Siam* reverses this somewhat, being dun, or fawn-color, with black face, ears, tail, and feet. The *Manx* cat differs from others not only in being tailless (as a rule), but also, like the Siamese variety, has the hindquarters decidedly elevated. A white Manx cat is almost unknown, and black ones are exceedingly rare.

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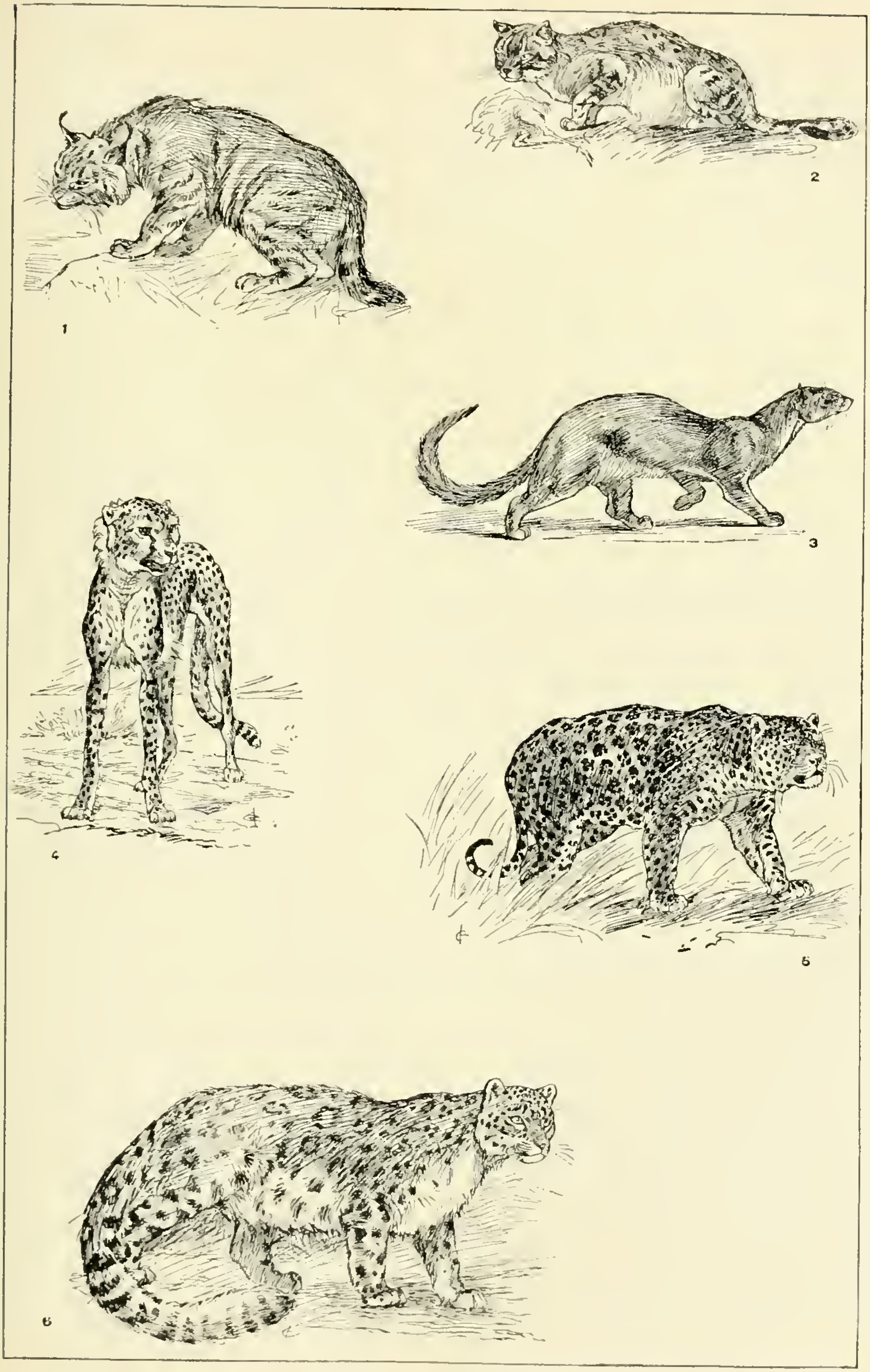
CAT (in old ships the cat-fall led through the cat-head, a projecting beam on the bow, frequently ornamented with a cat's head). In nautical parlance, the *cat*, or *cat-purchase*, is a device used in getting the anchor up in the securing position

WILD CATS



1. JUNGLE CAT OR CHAUS (Felis chaus).
2. EGYPTIAN OR CAFFRE CAT (Felis caffra).
3. EYRA (Felis eyra).
4. HUNTING CAT OR CHEETAH (Cynœlurus jubatus).
5. JAGUAR (Felis onca).
6. OUNCE (Felis uncia).

after it has been hoisted by the capstan as far as the hawsepipe. See Anchor.

CAT. In military engineering, a heavy beam with a sharp iron point, used during the Middle Ages in besieging castles or towns. It was provided with a movable cover of timber, for the protection of those who worked it, by swinging it back and forth. It was called a cat because it clawed into a wall. It was also known as a mouse or fox, because it gnawed a round hole, and as a hog or sow, from the round back of its cover, or because it worked with its tusk, like a boar.

CATABANGAN, kä'tà-bän-gän', or **CATUBANGAN.** A Malay-Negrito people in Tagábas Province, southern Luzon. See Philippines.

CAT'ABAP'TISTS (Gk. *καταβαπτιστής*, *katabaptistēs*, from *κατά*, *kata*, down + *βαπτίζειν*, *baptizein*, to baptize). A general name applied by Zwingli and others, instead of the more common term Anabaptists, to those who baptized only believers, and denied the validity of infant baptism. The term was defined by Zwingli as equivalent to pseudo-baptist, but the fact that etymologically it means a *drowner* was not lost sight of.

CAT'ACAUS'TIC CURVE. See Caustic.

CAT'ACHRE'SIS. See Rhetoric, Figures of.

CAT'ACLYSM (Fr. *cataclysme*, Lat. *cataclysmos*, Gk. *κατακλυσμός*, *kataklysmos*, from *κατά*, *kata*, down + *κλύζειν*, *klyzein*, to dash, of waves). A term used by some of the earlier geologists to denote sudden changes, such as those which might be produced by deluges, as the Noachian Flood, or by sudden upheavals. They considered that deposits such as the drift were formed in this manner. The word has been dropped from geological terminology. See Catastrophism.

CATACOMBS. The Catacombs tell us substantially all that we know of early Christian art, and a large part of what we know of the life of that time. The term is of uncertain derivation, and is used to designate a network of subterranean chambers and galleries excavated in the soft rock, and especially those used primarily for burial purposes by the early Christians, and, in times of persecution, for refuge and for religious services. They were called by contemporaries *Cœmeteria*, 'cemeteries,' or *crypta*, 'hidden places': the term 'catacomb' (*catacumba*) is of mediæval origin. The lower classes of Romans were usually cremated, and their ashes put into urns in sepulchral chambers called *columbaria* (q.v.); but Christian usage forbade incineration, so separate burial was resorted to in property belonging to wealthy converts or purchased by association. Burial in cemeteries above ground was used generally, but where the subsoil consisted of some kind of easily worked, rock-like tufa, the burial was made in underground galleries, which we now call catacombs. Such catacombs exist in various parts of the early Christian world—the Crimea, Asia Minor, Syria, Egypt (Alexandria), Cyrenaica, Malta, Sicily, (Syracuse), Italy (Rome, Naples, Chiusi).

By far the most important group is in Rome, and it is by the study of these Roman catacombs that we know anything of the Christian arts of the first four centuries, and can better understand the life and feelings, manners and customs of the early Christians. About sixty of these are known. They are all outside the city walls, within a radius of 3 miles, excavated in the tufa wherever it was of the right kind—i.e. granular. The larger ones consist of a confusing maze of galleries, but this was by no means their original condition; rather, the result of gradual evolution. During the First and Second centuries a Christian landowner would establish a small catacomb for the burial of his family, freedmen, and slaves, and would set aside for the purpose a small rectangular patch of ground, or *area*, measuring, say, 100 by 200 feet, which was registered as a family burying-ground, and became inviolable under common Roman law. A single gallery ran within the outer edge of this rectangle, about 8 feet high by 3 feet wide, in whose sides were cut *loculi*, one above another, to receive the bodies. The loculus was low, as long as the body, and its depth varied to contain from one to three or four members of the same family. Persons of distinction were buried in chambers, or *cubicula*, which opened out of these galleries, and for these burials carved sarcophagi were often used, placed in arched niches, or *arcosolia*. Usually some martyr was buried in such chambers, and his tomb served as an altar at which services were celebrated. As Christianity progressed and burials multiplied, the plot of ground was honeycombed with galleries, parallel and at right angles; and when one story of them was no longer sufficient, staircases were made and a second line of galleries excavated beneath. This was followed, if necessary, by a third, fourth, or even fifth story of galleries. Sometimes the extra room was gained by increasing the height of the galleries through lowering the floor-level. As persecutions increased in virulence, the catacombs became places of refuge and worship, where Christians could avoid arrest, as burial-places had right of asylum by law, and when churches above ground were confiscated and destroyed by imperial orders and religious meetings interdicted, it was always possible to use the catacomb chapels for services. Such importance did the catacombs, therefore, assume that in the Third Century their administration was no longer left in the hands of private persons, but was assumed by the Church. The city was divided into parishes—twenty-five or more—and to each one was assigned a catacomb outside the walls for the burial of its church members. Above its entrance was a chapel for religious services. The head deacon of the church was their administrator, and under him were the body of *fossores*, or excavators, the artisans who executed the marble slabs with their inscriptions and symbols, the lamps and the symbolic wall-paintings. The chief cemetery then became that of Calixtus, and here the bishops of the Third Century were buried in a special crypt. Passages were cut to connect the neighboring catacombs, but without allowing the burials to extend beyond the appointed legal limits. A new period began, however, in the middle of the Third Century, when the violence of popular hatred refused any longer to recognize the inviolability of the Christian places of burial, and persecuting mobs and officials invaded them. Christians then destroyed the entrances, with their oratories, feasting-halls, and open staircases, filled up the front galleries, and made other and secret entrances, usually from neighboring sand-pits (*arenariæ*). There was no longer any need to restrict the catacomb limits, as there was no longer any legal protection, so all the spaces between the various small catacombs were honeycombed with passages, and one immense catacomb was made out of many. Thus all regularity of arrangement was lost, and the present intricate type created. All the catacombs in a single high ridge, up to the low parts where excavation had to be stopped for fear of flooding, were thus joined, and a few large groups created around the city. The bloody persecution of Diocletian multiplied burials of martyrs and made wholesale enlargement necessary. Then came, with Constantine, the end of persecution. Soon Bishop Damasus voiced the universal reverence by his monumental restorations, clearing passages, identifying tombs of martyrs, and placing commemorating inscriptions in verse, building or decorating underground chapels and basilicas at the entrances. During the whole of the Fourth Century, and until about A.D. 410, burials continued to be numerous in the catacombs, through the desire of the faithful to rest near the martyrs; and then, finally, all burials were transferred to the surface cemeteries connected with churches. The catacombs, however, provided with small basilicas and chapels at their new entrances, remained objects of sacred pilgrimages and anniversary services, not only for Romans, but for pilgrims from the whole Christian world, and several literary records of such pilgrimages remain, from the poems of Prudentius to the *Itinerary* of Einsiedeln. Then came the disastrous invasions of the Goths, Vandals, Lombards, and Saracens, which involved the destruction, first or last, of all suburban buildings, the transporting to the city of the relics of the most noted martyrs from the catacombs, the closing of their entrances, and the filling up of their galleries with earth to prevent desecration—especially at the time of the Saracen invasion in the Ninth Century. From that time until the Sixteenth Century the catacombs were entirely lost sight of. After that they have been gradually reopened, and explored by such men as Bosio (1593-1629), Boldetti, Marchi, and especially by De Rossi; but their riches have by no means yet been exhausted.

The following is a list of the principal catacombs around Rome, arranged according to the Roman roads along which they are placed: *Via Appia*, Catacomb of Calixtus, Catacomb of Prætextatus, Catacomb at Catacumbas; *Via Ardeatina*, Catacomb of Domitilla; *Via Portuensis*, Catacomb of Pontianus; *Via Salaria Vetus*, Catacomb of Basilla (= Saint Hermes); *Via Salaria Nova*, Catacomb of Maximus (= Saint Felicitas), Catacomb of Thraso, Catacomb of Priscilla; *Via Nomentana*, Ostrian Catacomb, Catacomb of Saint Agnes; *Via Tiburtina*, Catacomb of Hippolytus, Catacomb of Saint Laurentius (= Catacomb of Cyriaca): *Via Labicana*, Catacomb of Saint Peter and Marcellinus. Of all these, that of Calixtus is by far the most important, and has been the most fully illustrated. It contains the famous papal crypt, where the popes of the Third Century were buried, and an analysis of its component parts best illustrates the growth of a large catacomb from the union of many units—in this case some twelve in number. Its earliest nucleus was the crypt of Lucina, the private burying-lot of that matron. Not only this and other parts of the catacomb date from the First Century or early Second Century, but the same is true of parts of the catacombs of Domitilla and Priscilla, which almost rival that of Calixtus.

The historic interest of the Roman catacombs is incalculable. All the churches belonging to the pre-Constantinian period seem to have disappeared without leaving a trace behind; consequently, the chapels of the catacombs are alone in showing how the early liturgical prescriptions —for example, those of the *Apostolic Constitutions*—were conformed to. The old theory that the catacombs had been really excavated as sand-pits and for the extraction of tufa by the pagan Romans, and had been simply appropriated by the Christians, was first attacked by Marchi and totally disproved by De Rossi; they are entirely the work of the Christians themselves, and were sometimes connected with the sand-pits only as a matter of convenience in the Third Century, as already explained. Using ancient literature as a guide, De Rossi undertook a series of excavations by which he laid bare a large part of ancient subterranean Rome, at the expense of the Papal Government, aided by private subscriptions.

After the Italian Government had occupied the Papal States, in 1870, Parliament decreed that not only should the Vatican, with Saint Peter's, Saint John Lateran, the summer residence of Castel Gandolfo, etc., remain under the jurisdiction of the Pope, but also the catacombs, which the Government authorities cannot, therefore, excavate. It is partly from lack of funds, partly from the opposition of private landowners, that excavations are so slow and spasmodic. About 15,000 inscriptions have come to light, but this is only a fraction of what remains underground. De Rossi believes they once numbered over 100,000. After the catacombs were rediscovered, in 1578, they were recklessly despoiled, especially of inscribed stones, which were collected as curiosities or used by hundreds as building material. In this way a large part of their epigraphic riches was dispersed and destroyed, and no systematic collection of early Christian epigraphy was ever made, such as was the case with classical inscriptions. Whatever could be done at so late a date was done by the late De Rossi, who grouped the available materials in one of the galleries of the Vatican, arranged according to their themes. In the Vatican Museum, also, are many of the small objects rescued from the catacombs (*Museo Cristiano*, etc.); others are in the Kircherian Museum, over the Biblioteca Nazionale. The Lateran Museum has the greatest collection of sarcophagi, as well as some fac-similes of frescoes and many inscriptions—a collection made under Marchi and De Rossi. The catacombs themselves can be visited with ease in all important parts, and though most of the inscriptions, *tituli*, and small objects have been removed, enough remain *in situ* to show what the original condition must have been.

It was natural that the data furnished by the catacombs for the earliest Christian history should give food for heated partisan controversies between Roman Catholic and Protestant archæologists, the latter denying the post-apostolic age claimed by De Rossi for the earliest monuments, and disputing many interpretations of catacomb frescoes that seemed to support Catholic dogmas. Schultze has been the most vigorous of the Protestant archæologists. However, the general unprejudiced consensus of opinion is in favor of De Rossi's views. Since his death little has been done, but the recently organized conventions of Christian archæology have reawakened interest, excavations are being renewed, and the patient and original investigations of Wilpert promise a new advance, when we shall possess a work in which the catacomb frescoes will be reproduced in photographic plates for the first time.

The decorative art of the catacombs is confined to the chambers where the most distinguished persons received burial; the long galleries, or *ambulacra*, where the masses were buried remained perfectly plain, with straight sides and arched or pointed roof, roughly hewn. The burial cavity, the *locus* or *loculus*, was closed with a *tabella*, or slab, on which was cut the *titulus*, or funerary inscription, usually accompanied by one or more emblems, or even figures. To it were also attached a variety of objects in the shape of offerings, such as terra-cotta lamps, that were kept burning on anniversaries, as well as glass vases or bottles, medals, coins, etc. At intervals a shaft was cut connecting the gallery with the surface, and letting in light and air. They were called *luminaria*, and were funnel-shaped. They were also used for extracting the material excavated from a gallery, and for letting down sarcophagi. The chambers opening at intervals from the galleries were either the smaller *cubicula*, which were private burial rooms for families or associations, or the larger *cryptæ*, used for religious services and for the burial of great personages and martyrs. These crypts were provided with altars and seats, and were often double, so as to provide for the separation of the sexes. Here are to be found the majority of the *graffiti*, scratched by pious pilgrims; here are the monumental inscriptions, and the pious desecration of earlier tombs to bury others near the martyr.

The small catacombs in their primitive arrangements can be studied in those of Domitilla (near the entrance), of Priscilla, the Ostrian, and that of Lucinda, in the Calixtus group; to these must be compared the two superb halls of the catacombs of Saint Januarius at Naples. They date almost certainly from the close of the First Century, from the generation after the Apostles, and here some of the earliest converts were buried. In the Second Century comes the rich catacomb of Prætextatus, with its superb ambulacrum, and three others that are not yet explored. This is, from the purely artistic point of view, the Golden Age. The frescoes in the catacomb of Domitilla are the most artistic yet found; the motif of the vine with Cupids gathering the vintage, which afterwards becomes stiff and geometric in its composition, is here free and gracefully naturalistic. The same decorative feeling is shown in some landscapes in the same chambers. There is a flavor of the Augustan Age. The paintings that have a more definite religious character are also treated with naturalism—pastoral scenes of fishing and shepherding, symbolic of baptism and redemption; Noah and Daniel, both types of saved souls; two figures at a banquet of loaves and fishes, either of eucharistic significance or representing the joys of Paradise. The crypt of Lucina has the most beautiful and well-preserved of painted crypt ceilings, which reminds one of such pagan ceilings as those of the baths of Titus. It has a graceful, symmetrical arrangement of compartments with single figures. Were it not for well-poised figures of the Good Shepherd and the *Orans* in the spandrels, and of Daniel in the centre, the rest of the decoration, with its flying genii, heads of the Seasons, doves, vases, fruits, and flowers, might very well belong to some pagan tomb of the Via Latina. Almost as charming is another ceiling of the same character in the catacomb of Calixtus, with a decorative frame of concentric circles and spandrel ornaments, within which are peacocks, doves, winged genii, shells, and vases, and with nothing but the Good Shepherd in the centre as a proof of Christianity.

To understand the reason for the selection of certain themes for the frescoes, it must be remembered that their object was to commemorate the departed. The key is given in the prayer for the dying of an early liturgy: "Deliver, O Lord, the soul of thy servant, as thou deliveredst Enoch and Elijah from the common death, . . . Noah from the deluge. . . . Job from his torments, . . . Isaac from the sacrifice, . . . Moses from the hand of Pharaoh. . . . Daniel from the den of lions, . . . the three youths from the fiery furnace," etc., to which other prayers add the examples of Tobit and Jonah. These are precisely the themes from the Old Testament most commonly depicted in the frescoes, always with this symbolic meaning.

The portrait of the deceased is very seldom given, either in painting or in outline on the slab, because it did not harmonize with the stress laid by Christian sentiment upon the future life. It was the soul, not the body, of the defunct that was, therefore, typified in different forms. The female figure, with both hands raised in prayer, is the main symbol both of the individual soul and of the whole body of believers—the Church. She is called the *Orans* (*orare*, to pray). The companion figure to the *Orans* is Christ as the Good Shepherd. These two—the Saviour and the saved, the Shepherd and the sheep—are substantially the whole of the significant part of earliest Christian imagery, as we see it on the ceiling of the crypt of Lucina. But the soul was also represented in other obvious ways—as a *lamb*, mainly emblematic of the elect on earth, not in heaven: as a *dove*, the soul in heaven; as a *fish*, in the image of Christ, the divine fish, who is called the *Fish of the Living*. In almost every such symbol the meaning is complex, and with subtle but simple transitions. Thus, the dove is: (1) The emblem of the Holy Ghost, and as such descends on Christ at baptism, and on the Apostles at Pentecost; (2) the Divine Messenger, like the dove of the ark, and as such brings assurances of peace and salvation to the soul, as in the epitaph of Irene at Saint Calixtus, where the soul, as an *Orans*, is receiving an olive branch from a dove; (3) as the transfigured soul after death, *palumbus sine fel*, in which sense the twelve Apostles are represented as doves. Of all these facets the central idea is that the dove is the vehicle of the spirit, whether sent from God or returning to God. Two of these separate meanings are combined in some compositions, where in Noah's ark, representing the Church, stands, not Noah, but the soul of the deceased, toward which the dove is flying with the olive branch. Another series of symbols is that embodying the cardinal Christian beliefs—the anchor is hope and the cross; the fish is the divine food and Christ, as well as the believer: the peacocks are immortality: the phœnix is resurrection; flowers are paradise. The regeneration by baptism and by partaking of the Eucharist are also themes represented from first to last, beginning in the sacramental chamber of the Catacomb of Domitilla.

The sepulchral inscriptions or epitaphs discovered in the catacombs belong to every stage of their history and to every variety of technique. Some are beautifully engraved, others irregularly; some are scratched rather than cut on the marble slab; some of the earliest are not cut, but painted in red or black; while others are traced on the fresh mortar. At times the front of the *locus* is closed by a single inscribed slab, and the lettering is inclosed in a frame; at times the *tabella* is made up of two or three pieces, or is even of terra-cotta. It is extremely interesting to note that the majority of the earliest inscriptions, before the middle of the Third Century, are not in Latin, but in Greek—a sign of the preponderance of Greeks among the early converts, and of Greek as the sacred tongue. The earliest are the simplest; they also are least often dated. Often the bare names of the deceased are given, without mention of age, day of death, or the relative who set up the memorial—facts that are very common in the Third and Fourth centuries. Very usual, in these earliest cases, are the exclamations of simple faith and prayer, which later go out of fashion. One feels that the early formulas were more personal; the later ground out by an official registry mill. In Northcote's selected specimens (page 33) are examples where the one name stands alone as the whole inscription—'Honorata'; or the usual triple name—'C. Munatius Octavianus'; a simple acclamation. "O Eusebius, mayest thou live." Other acclamations added to the name are: "May God refresh thy spirit;" or "Pray for thy husband:" "Sweet soul, mayest thou live:" "Live in Christ and pray for us." We obtain from these inscriptions the clearest conception of simple Christian faith and constancy. The early liturgies, when they say, "Gather them, Lord, in a green pasture, by waters of rest, in a paradise of joy, whence all trouble, all sadness, and sighs are banished," and the like, give a picture of which these inscriptions are the counterpart, and which find a *naïf* illustration in some catacomb frescoes which depict the elect in paradise. Such is a fresco in the catacomb of Saint Soter.

The ancient authorities that help in identifying the catacombs, in tracing their historic stages and connecting them with different martyrs are: the *Acta Martyrum*, or reports on martyrdoms, more or less contemporary, which often relate where the bodies were placed; the *Liber Pontificalis*, early lives of the popes, which mention transformations and Papal burials in the crypts; the inscriptions of the catacombs themselves; the early literature, such as the poems of Prudentius, the poetic inscriptions of Pope Damasus; the descriptions of pilgrims, such as the *itineraries* of the Seventh and Eighth centuries; the topographical monographs on Rome of the later Middle Ages, such as the *Mirabilia Urbis Romæ*.

The fundamental modern books on the catacombs are those of Giovanni Battista de Rossi, who not only published descriptions of the most important catacombs and their contents, but established the correct method for studying and identifying them, determining their dates and history. He founded the science of early Christian archæology by his *Roma Sotterranea Cristiana* (3 vols., Rome, 1861-77); his *Inscriptiones Christianæ urbis Romæ* (2 vols., Rome, 1861-88); his *Bulletins di Archeologia Cristiana*, published quarterly since 1863, and his part of the *Corpus Inscriptionum Latinarum* that refers to Christian inscriptions. The English manual of Northcote and Brownlow, *Roma Sotterranea* (2 vols., London, 1879), the French of Allard, *Les Catacombes de Rome* (Paris, 1896), and De Richemont, *Nouvelles Etudes sur les Catacombes Romaines* (Paris, 1870), the German of Kraus, *Roma Sotteranea* (Freiburg, 1879), are all of them summaries of De Rossi's results for those who cannot consult the expensive and ponderous works of the master. Each language has also had a Dictionary of Christian Antiquities which embodies the same materials, though it also treats of the later period: Martigny, *Dictionnaire des antiquités chrétiennes* (Paris, 1877); Smith and Cheetham, *Dictionary of Christian Antiquities* (London, 1875-80); Kraus, *Real-Encyklopädie der christlichen Alterthümer* (Freiburg, 1880-86). Still later handbooks have been issued, some more systematic, others more detailed, and usually showing some independence of judgment. Such are: Pératé, *L'Archéologie chrétienne* (Paris, 1892) (in the Quantin Series); Schultze, *Die Katakomben* (Leipzig, 1882); Wilpert, *Principienfragen der christlichen Archäologie* (Freiburg, 1892); and lastly Marucchi's three small volumes, of which two have appeared and which give the fullest and ablest modern statement: O. Marucchi, *Eléments d'archéologie chrétienne* (Paris-Rome, 1899-1901). A brief and very popular account is given in Boissier's *Promenades archéologiques* (Paris, 1880). To these should be added Garrucci's colossal work, *Storia dell' arte cristiana* (Prato, 1881), whose second volume contains outlines of most of the known catacomb frescoes. Both Garrucci and De Rossi rely on the early work of Bosio, *Roma Sotterranea*, published in Rome (1650), which described and gave plates of many works since then lost.

CATACOMBS OF PARIS. Vast excavations extending under the city of Paris, formerly subterranean quarries which furnished the building material for the city. In the latter part of the Eighteenth Century some portions of the city began to sink and it was necessary to strengthen the roof of the quarries with masonry. In 1787 the catacombs were arranged to contain the bodies removed from other burying-grounds, and it is estimated that upward of 6,000,000 bodies are now preserved in them. The bones are arranged in varied designs along the sides of the galleries.

CAT′AFALQUE (Fr., OF. *cadefaut*), or **CATAFALCO**, kä′tȧ-fäl′kō (It., from It. dial. *catar*, to find, O.Sp. *catar*, to see, Lat. *captare*, to try to seize, to watch, from *capere*, to hold + **falco* for *balco*, stage, Ger. *Balke*, AS. *balca*, beam). A temporary structure of carpentry, with hangings, and decorated with sculptures and paintings, intended to represent a tomb or cenotaph. It was used for the lying in state of notable deceased persons, and at commemorative services. (See Cenotaph.) The catafalque was sometimes so extensive a structure as to become a mortuary chapel (*chapelle ardente*); it was usually erected inside a church. Movable catafalques are employed in funeral processions. A magnificent catafalque was used at the burial of Michelangelo in Florence. It was executed by the principal Florentine artists of the time.

CAT'ALAN. See Catalonia.

CATALANGAN, kä'tȧ-län-gän'. A Malay-Chinese people in Isabela Province, Luzon. They speak the Iraya language, and belong to the first migration. See Philippines.

CATALAN GRAND COMPANY, The. A powerful band of mercenaries noted for the part it played in the wars of the Byzantine Empire during the first half of the Fourteenth Century. It originally consisted of natives of Aragon and Catalonia, partly Christian and partly Moslem, who fought in Sicily during the wars that followed the famous Sicilian Vespers, in 1282. With the conclusion of peace in 1302, the Catalans, numbering some 6000 men, under the leadership of Roger de Flor, entered the service of Andronicus II., Emperor of Constantinople, and were sent against the Turkish armies which were then ravaging the Asiatic provinces of the Empire. The Catalans defeated them decisively, and then entered upon a course of pillage and rapine, unchecked by the remonstrances of the Emperor, who was too weak to enforce obedience to his orders. In 1306 Andronicus caused Roger to be assassinated, at Adrianople, and the greater number of the Catalans fled. A band of 1500, however, consisting mostly of Frenchmen, after defeating an army of 43,000 men, seized the fortress of Gallipoli, on the Hellespont, and held it for four years against the Emperor, ravaging Thrace, and levying tribute on trade. In 1310 they abandoned Gallipoli, and, marching into Greece, entered the service of Gualtier de Brienne, Duke of Athens, whom, in the following year, they overthrew in a battle on the Cephissus, making themselves masters of Bœotia and Attica. The widows and daughters of the fallen Latin nobles became the wives of the Catalan officers. Subsequently the Duchy of Athens was made an appanage of Aragon. The power of the Catalans rapidly declined, and disappeared before the end of the Fourteenth Century. Consult Gibbon, *Decline and Fall*, Chap. LXII.

CATALANI, kä'tȧ-lä'nė, Angelica (1780-1849). A celebrated Italian soprano, born at Sinigaglia. She was educated in the Convent of Santa Lucia, Gubbio, where, in her seventh year, she displayed such wonderful vocal powers that strangers flocked from all quarters to hear her. After two years of study with Boselli, she made her first appearance in Venice in her sixteenth year, and the furore she created was extraordinary even for Italy. Managers were outbidding one another for her services, composers were vieing for the honor of having her sing in their operas. She swept through the chief cities of Italy like a meteor, arousing enthusiasm at the Scala in Zingarelli's *Clitennestra* and Niccolini's *Baccanali di Roma* (1801). She sang in Lisbon, with Crescentini and Gaffroni, from 1801 to 1806; married Captain Vallabrègue, then attaché in the French Embassy, and reaped a golden harvest in Madrid and Paris. Her success in London (1806) eclipsed all her previous efforts, and she stayed there from 1807 to 1814, worshiped by her audiences. She was then in the zenith of her vocal powers and fame. Napoleon's exile permitted her to go to Paris, where she was made directress of the Italian opera. Her husband was an incapable business man, and the venture absorbed the sums of money she had made. In 1817 the lease and subvention was withdrawn, and Catalani found herself compelled again to turn to the operatic stage for a living. For ten years she traveled all over Europe, her performances evoking ever-increasing enthusiasm. In 1827 she retired from the stage, lived for some time in Paris, and then (1830) settled at her villa near Florence, where she established a free singing school for talented girls. Thereafter she only occasionally appeared in public, at charitable affairs. She died of cholera in Paris. Catalani was one of those rare cases in which Nature seems to lavish upon one individual all the gifts in her possession. She was a woman of exceptional beauty, and, though large of frame, of infinite grace and majestic appearance. With her personal charm she united great vivacity, and dramatic power worthy of a queen of tragedy. But her greatest gift was her voice—a soprano of nearly three octaves in range. Its unexampled power and soulfulness made her delivery of sacred music sublime, while its sweetness, flexibility, and rapidity of execution carried her audiences by storm. Consult: Edwards, *The Prima Donna*, Vol. I. (London, 1888); Ferris, *Great Singers* (New York, 1893); Needham, *Queens of Song* (London, 1863).

CATALAN LANGUAGE AND LITERATURE. One of the group of Romance languages (q.v.). It is spoken to-day by upward of 3,500,000 people: (1) In the eastern portion of the Pyrenees and along the coast of the Spanish Peninsula, including the whole of the French Department of Pyrénées Orientales, and the seven Spanish provinces of Gerona, Barcelona, Tarragona, Lérida, Valencia, Alicante, and Castellón de la Plana; (2) in the Balearic Islands; (3) in the district of Alghero in Sardinia; (4) in some parts of Cuba and the Argentine Republic. It is not a separate branch, lying midway between the Spanish and Provençal, but merely an offshoot of the latter, which during the Middle Ages raised itself for a time to the dignity of a literary language, and so is still treated separately by students of the Romance languages. The chief peculiarities of Catalan are: (1) The prevailing use, in the conjugation in *-ir*, of the so-called inchoative form, a form known to some extent to all the Romance languages, excepting the Spanish group. (2) The formation of a number of perfect participles from the infinitive stem, instead of the perfect stem. (3) The treatment of unaccented final vowels, *a* being retained and the other vowels dropped under the same circumstances as in French and Provençal. (4) The retention of the original pronunciation of the Latin *ū* where the French and Provençal have *ü*. This is the one important difference between Catalan and the Gallic group, and has not yet been satisfactorily explained.

In no other of the Romance literatures are prose and poetry so sharply differentiated. Throughout the earlier part of the Middle Ages, down to the end of the Thirteenth Century, the Catalan poets continued to write in the language of the Troubadours, a more or less imperfect Provençal; and even at a much later date, when the language had become better adapted to poetry, thanks to its numerous prose writers, the Catalan poets still clung to certain words and idioms characteristic of the Troubadours or the poetry of the Toulouse Academy. In Catalan poetry, three periods are recognized: (1) That from King Peter IV., who in 1378 wrote *cobles* to his son, King Martin of Sicily, down to nearly the middle of the Fifteenth Century. (2) The middle portion of the Fifteenth Century, which owes its fame to the works of Auzias March and the younger poets who gather round him as their head, and is characterized by a strong coloring of Italian influence. In the *Cants d'amor* and *Cants de mort* of Auzias March there are many poems of real beauty; but they are marred by his obscurity, which, indeed, is a characteristic fault of the school. (3) The period of decline has no name of real merit, but is interesting to the student for the changes it shows in its metres and the first symptoms of Castilian influence. While the Catalan poetry was an exotic production, the prose was a more original growth, and shows some names worthy of remembrance. Among these the philosopher Ramon Lull, usually called Raymond Lully (died 1315), and the historians Muntaner and Desclot deserve mention. After the Sixteenth Century the language sank once more to the level of a patois. Recently, through the renewal of the old-time *jochs florals*, or floral games, at Barcelona (1859), popular enthusiasm has been aroused, resulting in a revival of the language for literary purposes, which the fraternal relations established with the *Félibres*, or modern Provençal poets, have done much to promote. The most notable modern Catalan writers are the poets Balaguer and Verdaguer. The best works upon the Catalan language are: Mila y Fontanals, *Estudios de lengua catalana* (Barcelona, 1875); Morel-Fatio, in Gröber's *Grundriss der romanischen Philologie* (Strassburg, 1888). For Catalan literature, consult Morel-Fatio, in Gröber's *Grundriss*, Vol. II. (Strassburg, 1892).

CAT'ALAU'NIAN PLAIN (Lat. *Campi Catalaunici*, named from the Gallic tribe of *Catalauni* or *Catelauni*). The ancient name of the wide plain surrounding Châlons-sur-Marne, in the old Province of Champagne, France, celebrated as the field of battle where the Visigoths and the forces under the Roman general Aëtius successfully encountered Attila in A.D. 451, thus arresting the westward progress of the Huns. A wild tradition (made the subject of a striking picture by Kaulbach, "Die Hunnenschlacht," or "The Battle of the Huns") tells that three days after the great fight the ghosts of the fallen myriads appeared on the plain and renewed the conflict. This engagement is usually spoken of as the battle of Châlons, but recent research makes it probable that it was fought at some distance from that city.

CATALDI, kä-täl'dê, PIETRO ANTONIO (1548-1626). An Italian mathematician. He was successively professor of mathematics in Florence (1563), Perugia (1572), and Bologna (1584), and is chiefly known as a pioneer in the use of continued fractions, the common form of which he invented (1613) and employed in the extraction of square roots. (See FRACTIONS.) His method, however, is more novel than practical, and is quite inferior to that of Cardan. Besides a work on perfect numbers (1603), a treatise on Dürer's construction of regular pentagons (1620), and a three-volume edition of Euclid (1620-25), his chief works are: *Trattato del modo brevissimo di trovare la radice quadrata dei numeri* (1613); *Trattato dell' algebra proporzionale* (1613); *L'algebra discorsiva numerale et lineare* (1618); and *L'algebra applicata* (1622).

CAT'ALI'NA. A town and port of entry on Trinity Bay, Newfoundland, 60 miles north-northwest of Saint John's (Map: Newfoundland, G 4). It has a fine harbor of refuge, with a prominent lighthouse. Population, 1700.

CAT'ALEPSY (Lat., from Gk. *κατάληψις*, *katalēpsis*, seizure, from *κατά*, *kata*, down + *λαμβάνειν*, *lambanein*, to take). A condition of partial or complete unconsciousness, in which the patient voluntarily assumes, or may be caused to assume, an attitude which he retains for several minutes. It occurs in hysteria (q.v.), or under the influence of hypnotism (q.v.) more commonly, but is also seen in atonic melancholia (q.v.) and a variety of mania called katatonia. The patient may assume the attitude of attention, with hand and forefinger raised as if to command silence, or may raise the arm as if to protect himself, etc. In all instances the facial expression comports with the gesture, and the whole body remains rigid till the arm falls slowly by gravity and relaxation. An arm or leg may be slowly raised into a position which will be retained for several minutes. If the subconscious condition lasts over a day, as in the cases occurring in insane patients, they must be fed with the stomach-pump. Circulation, respiration, urination, defecation, and digestion continue normally. Trance, lethargy, and the sleep that is prolonged for days are all cataleptic states, and are due to hysteria or to auto-hypnosis. It is within the range of possibility that this condition may be mistaken for death; but ordinary tests will easily decide, though the sensibility for pain or heat may be lost. In many cases the patients hear and respond to suggestion. All prolonged cases should be fed artificially, and close scrutiny will result in the detection of simulation in some instances. The immediate cause of catalepsy is unknown. Consult Dana, *Text-book of Nervous Diseases* (New York, 1901).

CATALOGUE OF SHIPS. A name commonly given to the last 394 lines of the second book of Homer's *Iliad*, in which the Greek forces which proceeded against Troy are enumerated in detail.

CATALOGUING. The work of making catalogues and bibliographies, both of which deal with entire books as units. The cataloguing of books and literary material preserved in libraries is a matter of great importance. A large library contains a million or more different items, any of which may be wanted quickly by some reader, and much of the value of the collection depends on good catalogues, without which the material is of little more practical value than so much 'pi' in a printing-office. The seeker for some specific book may ask for such a work by such an author, or for a work of which only the subject is known, while not infrequently a reader has in mind some book which he has seen but of which he can give accurately neither author, title, nor subject, remembering merely some accident of form, language, size, binding, date, illustrations, or the literary form in which the subject is treated. While some libraries make many special catalogues and lists to enable them to answer unusual questions, only two catalogues are essential to meet all reasonable demands, that by authors and that by subjects. Most other questions can, by double reference, be answered by bibliographies, digests, and indexes, by finding in what book the desired matter is printed and then consulting the catalogue to see if it contains that book. See BIBLIOGRAPHY; DIGEST; INDEX.

The title of every book in a library has three essential parts: (1) author; (2) title proper (as copied from the title-page or condensed for brief work by the omission of unimportant matter but never by rewording); (3) imprint and collation, or place, publisher, date, volumes, pages, illustrations, price, or other bibliographic details. The addition of notes, including contents, standpoint of author, form of treatment or other facts, in the most condensed form, is a modern improvement, gaining ground with great rapidity, as it is proved that nothing is a greater aid in getting into a reader's hands the work that is most valuable to him. These unit titles may be in manuscript or printed and may be either in book form or on separate cards or slips standing on edge in drawers or trays. If written by hand, the upright 'library hand' is important for highest legibility and uniformity. Titles can be typewritten with recent improvements more quickly and cheaply, and the greatly increased legibility and uniformity insure that hereafter most titles not regularly printed will be machine-written. In recent years there has been rapid increase in the number of libraries that print titles.

COÖPERATIVE CATALOGUES. Since 1876 the American Library Association has conducted numerous experiments seeking the great practical economy to be had from cataloguing a book in some central bureau, printing cards, and distributing them to all libraries buying that book, thus securing the highest grade of catalogue work and reducing cost in the department where it is most felt. The National Library in 1901 took up the systematic preparation and printing of cards which are distributed at two cents each. Through this agency catalogues will be immensely improved without increased cost. The great expense of satisfactory cataloguing is the item oftenest criticised, because least understood. The public now properly demands not only convenient guides to the best books, but also analyses of their contents. If what a reader needs is found in an article or chapter, it is just as important that he should be guided to it as to an entire book. The publishing board of the American Library Association, endowed by Andrew Carnegie, is constantly preparing practical aids to readers for the common use of libraries, utilizing the experience of all libraries and focalizing and publishing the results for the benefit of all. George Iles of New York has borne the cost of much of this work and made possible several of the most valuable guides to readers ever printed.

The most helpful book is the A. L. A. Catalog, a classified and indexed list of the 5000 volumes most valuable for an average town library. This was prepared in the New York State Library, published by the United States Bureau of Education in 1893 for the Columbian Exposition, and while lacking the most important elements, the notes, has been of great service. A new edition has been undertaken for the Saint Louis Exposition with the director of the New York State Library as editor, in coöperation with the leading libraries of the country. The list gives not only the selection which represents the experience of prominent experts in books throughout the country, but notes are added to show in the fewest words the scope, character, and value of each book, so that a reader can readily tell whether it is what he wants. The book is to be published by the Government, and many libraries will use it as a catalogue, marking copies to show what is on their own shelves.

CATALOGUE RULES. Rigid adherence to a definite code of elaborate rules is necessary to secure satisfactory results. Repeated efforts by eminent scholars to get on without what they thought needlessly formidable codes of rules have uniformly resulted in failure. The three most important English codes are those of the British Museum, the Bodleian, and the Library Association of the United Kingdom. These are printed together by the New York State Library School as Bulletin No. 13. For instruction in the Library School all these rules have been carefully digested, revised and edited, with additions for accession and shelf work, and printed in a single volume as *Library School Rules* (Boston, 1894). Cutter's *Rules for a Dictionary Catalogue* (Washington, 1891) is the recognized authority and indispensable guide for that form of catalogue. With it should be used the American Library Association list of subject headings for use in dictionary catalogues, with hints on subject cataloguing and schemes for subheads under countries and other subjects (Boston, 1898).

SHELF LISTS. As practically all libraries are adopting closer classification on the shelves, the shelf list, which is an inventory of the books as they stand on the shelves, becomes very useful as an official subject catalogue. This list gives the class, book, and accession number, with very brief author and title. It is used for taking the annual inventory, and is the most convenient short-entry classed catalogue. It is usually written on loose sheets laced into a binder so that sheets can be inserted or recopied as necessary.

BOOK *versus* CARD CATALOGUES. While ordinary readers prefer the book form, cards are rapidly superseding book catalogues. All libraries increase rapidly, and a new title cannot be inserted in the book catalogue, while titles may be added at any moment to the card catalogue, thus keeping it absolutely up to date. A book catalogue of a growing library is out of date before it can be bound and delivered, and most large libraries are adopting the card form, because it avoids entirely the necessity of rewriting as subjects grow.

Plan of Catalogue. The Author Catalogue is the first and most common. Authors are arranged in strict alphabetic order like a dictionary, and under each author are further arranged alphabetically by titles all works by him which the library possesses. A separate title catalogue is rarely made; yet titles must be given for anonymous publications, and also for books having titles specially likely to be remembered. These are usually inserted in the same alphabet with authors. The Subject Catalogue has now come to be regarded as essential as the author catalogue. It alone can tell what the library has on any subject, and obviously its educative value is very great. There are three distinct types: (1) *Classed.*—This has all subjects arranged in logical order, and to be conveniently usable must employ a system of notation with numbers or letters referring to each specific subject instead of to pages, and an alphabetic index where the most minute topic will be found followed by this number. (2) *Alphabetico-classed.*—In this the main subjects are in alphabetic order, and under each in sub-alphabets are divisions and sections, so that the catalogue is its own index. Cross-references may be inserted at any point, so that a topic can surely be found from the main alphabet without a subordinate index. (3) *Dictionary.*—This is naturally the most common type of catalogue, and its use has been growing steadily for a generation. It introduces specific subject entries in the same alphabet with authors and titles, thus making simple dictionary order. The easy rule to consult it like a dictionary, whether author, title, or subject is sought, appeals strongly to most readers. In spite, however, of its apparent simplicity, it requires the greatest skill to make, and while unexcelled for reference to a single topic, which is most common in popular libraries, in its nature it cannot put before the reader the resources of the library on generic subjects with the clearness or helpfulness of the classed catalogue.

If one wishes to see all the geometries in a library, direct reference to this word under G in the dictionary gives them as well as would similar reference to "Geometry" in the classed catalogue, but in the dictionary these are preceded by e.g. "Geology" and followed by "Geoponicon in sermanem Syriacum versorum quæ supersunt." In the classed catalogue, however, geometry is preceded by algebra and arithemetic and followed by trigonometry, calculus, and the other subjects most nearly related. If one wishes to see the mathematics of the library he must look in the dictionary under a dozen distinctly different heads to collect his titles, while in the classed catalogue they stand close together in logical order. If one makes a dictionary catalogue under the simple rule to write the subject at the head of the card and drop it into alphabetic order, the result will be largely worthless. It requires, like the class catalogue, a carefully elaborated system worked out in advance and scrupulously followed, otherwise books on the identical subject will be scattered all over the alphabet by the accident of the first word or of the word that happened to be in the cataloguer's mind when writing the headings. A book discussing protection and free trade might appear under P, F, or T, or under Tariff, Revenues, Subsidies, Customs, Duties, or other heads. All things considered, the merits of the two systems are well balanced. In the smallest library the classed list appeals strongly to teachers and others interested in the educational work of the library, because they know what its influence will be on inexperienced readers. In large libraries the classed form appeals to students and investigators who study not only specific, but generic subjects, and appreciate keenly the practical advantages possible only with an arrangement which follows the natural relation of subjects to each other rather than the purely accidental order of the alphabet.

Bibliography. Blackburn, *Catalogue Titles, Index Entries* (London, 1884); Cutter, *Rules for a Dictionary Catalogue* (Washington, 1891); Dewey, *Simplified Library School Rules* (Boston, 1899); id., *Decimal Classification* (Boston, 1885); Linderfelt, *Eclectic Card Catalogue Rules, Author and Title Entries* (Boston, 1890); Quinn, *Manual of Library Cataloguing* (London, 1899); Wheatley, *How to Catalogue a Library* (London, 1889); Richardson, *Classification, Theoretical and Practical* (New York, 1891).

CAT'ALO'NIA (Sp. *Cataluña*, Fr. *Catalogne*, Med. Lat. *Catalonia*, for *Gothalania*, from *Gothus*, Goth + *Alanus*, Alan). An old province and principality of Spain, occupying the northeastern corner of the kingdom, and bounded by France on the north (with the Pyrenees on the border) and the Mediterranean on the east and southeast (Map: Spain, F 2). Area, 12,430 square miles, comprising the modern provinces of Barcelona, Tarragona, Lérida, and Gerona. The coast is rugged and well indented. With the exception of a few low plains of limited extent, the surface of Catalonia is that of a wild, mountainous region, formed by numerous outliers or terraces of the Pyrenees, and by one great ridge or series of ridges extending through the centre of the district in a general southern direction. The chief rivers are the Segre, the Ter, the Llobregat, and the Ebro, all flowing into the Mediterranean and none navigable except the Ebro. The climate of Catalonia, in spite of its unsteadiness and the prevalence of fogs and rain, is, on the whole, healthful and favorable to vegetation. Near Barcelona oranges flourish in the open air: the fields in some parts are bounded by aloe hedges, and olives are found on Montserrat. Cork-trees grow on the mountains, and thickets of thorn-apple, laurel, myrtle, pomegranate, box, rosemary, etc., extend where the cork has no growth. Northern Catalonia has a more severe winter than the southern portion, but everywhere vineyards and olive gardens cover the slopes, and corn-fields extend in the valleys. Among the other products are hemp, flax, madder, barilla, and saffron. Hazelnuts, a variety called Barcelona nuts, are extensively grown. Meadow-lands and pastures are comparatively rare, and horned cattle are, therefore, mostly confined to the districts bordering on the Pyrenees. Horses and mules are reared to a limited extent, but sheep, goats, and swine are bred in considerable numbers. Silkworms and bees also thrive. The coasts abound with fish, and game is plentiful. The minerals are coal, copper, manganese, zinc, lead, cobalt, salt, sulphur, and many varieties of marble. Catalonia is the principal manufacturing and commercial part of the kingdom, and has the best transportation facilities in Spain. The leading manufactures are cotton, silk, woolen goods, paper, arms, etc. The principal city and the capital is Barcelona. Population, in

1887, 1,838,799; in 1900, 1,984,115. The Catalonians are a mixed people, having the combined features of Iberian and Goth; are of low stature, dark brunette in color, with wide, projecting foreheads, and dark hair and eyes (cranial index, 77.7-78.1; French Catalans, 78.6). Their speech is a sub-variety of Provençal (Ripley, *Races of Europe*, New York, 1899). Catalonia has been in touch with most of the ethnic elements of western Europe. Upon its Iberian stock have been grafted the mixed race of Romans, the Scythian Alans, the Teutonic Goths, the Semitic Arabs, and the Alpine Franks. No doubt their progressive vitality is due to the mixture. In energy, industry, and intelligence they greatly surpass the rest of the Spaniards.

Catalonia, under the name of Hispania Tarraconensis, constituted a part of Roman Spain. It was invaded and subdued by the Alans, and, after them, by the Goths, who gave the country the name of Gothalania, changed in the course of time to Catalonia. In the Eighth Century the Arabs gained possession of the southern part. When Charlemagne, in 788, subjugated Spain as far as the Ebro, Catalonia formed the central portion of the Spanish mark governed by Frankish counts who had Barcelona as their residence. They soon made themselves independent of France. In 1151 Earl Ramon Berenguer, by his marriage with the Princess Petronilla (1137), united Catalonia with Aragon, to the future greatness of which Catalonia contributed in a very great measure by reason of its wealth and the influence wielded by the citizens of Barcelona, its capital, in the western Mediterranean. See SPAIN, paragraph on *History;* CATALAN LANGUAGE AND LITERATURE. Consult: Bori y Fontestá, *Historia de Cataluña* (Barcelona, 1898); Balari y Jovany, *Orígenes históricos de Cataluña* (Barcelona, 1899).

CATAL'PA (Amer. Indian). A genus of trees of the order Bignoniaceæ. *Catalpa bignonioides* is a native of the southern portion of the United States, and is cultivated there and in the cities of the Northern States as an ornamental shade-tree. It may be known by the silver-gray bark, wide-spreading but few branches, and large, pale-green, heart-shaped leaves. The flowers are white, tinged with violet or purple, and dotted with the same colors. They are succeeded by long, bean-like pods, that sometimes hang on the otherwise bare limbs all winter. The seeds are winged, the wings cut into a fringe. The wood is light and of fine texture, and useful in cabinet-work. (For illustrations see Plate of CALABASH, ETC.) A second species, *Catalpa speciosa*, is a larger and more hardy tree, indigenous in the United States from Indiana to Tennessee, and west through Arkansas and Missouri. It is readily distinguished from the former species by its thicker bark, and the flowers being very inconspicuously tinged or spotted. In rich lowlands this tree makes a very rapid growth, and it has been very successfully planted in Kansas and Oklahoma for its timber, the wood being valuable for railroad ties, posts, etc. In favored localities it is hardy in Minnesota. Other species are known from Japan and China.

The catalpa is subject to a leaf-spot disease, caused by *Phyllosticta catalpæ*, that sometimes causes the leaves to become brown and ragged, and, as the disease progresses, brings about the partial defoliation of the trees. If a severe attack is anticipated, it may be warded off by spraying the trees with any standard fungicide.

CAT'ALYT'IC ACTION (Fr. *catalytique*, from Gk. *καταλυτικός*, *katalytikos*, dissolving, from *κατά*, *kata*, down + *λύειν*, *lyein*, to loose). A term applied in chemistry to the action of one substance upon a second, whereby the latter is subjected to change or decomposition, while the former, or acting substance, remains unaltered, and does not combine with it. The phenomenon is also often spoken of as 'action of contact.' A well-known example of catalytic action is presented by the inversion of cane-sugar—i.e. its decomposition into dextrose and levulose in the presence of acids. The quantity of acid employed for producing the inversion remains unchanged, none of the acid being actually used up; yet the reaction could not take place if the acid were not present. The true nature of catalytic action is as yet unknown. It is now generally assumed, however, that catalytic agents do not *cause* reactions, but only *accelerate* and thus render them appreciable. In certain cases it has even been possible to trace a quantitative relation between the nature and amount of the catalytic agent and the acceleration caused by it. (See REACTION, CHEMICAL.) The catalytic action of acids (q.v.) is supposed to be due to the fact that in aqueous solution every acid dissociates, to a greater or less extent, into 'ions' charged with electricity, and it is the electro-positive hydrogen-ions ($\overset{+}{H}$) of the acid that are supposed to accelerate the reactions in question. It must be seen, however, that while this hypothesis is quite well founded on experimental facts, and thus certainly marks a step ahead, it does not by any means answer completely the question, What is the cause of catalytic action?

CAT'AMARAN' (Fr. *catamaron*, Hind. *katmaran*, Malayalam *kettamaram*, logs bound together, from *ketta*, binding, from *katta*, to bind + *maram*, timber). In its original form, a craft consisting of three logs—the middle one being longest—lashed together. It was used by the natives of the Coromandel Coast, particularly Madras; also in the West Indies and on the coast of South America. The Fiji Islanders developed this idea in their war-canoes, which consist of two parallel logs joined together with a platform, on which a mast is placed. These boats are safe and very swift, having a speed of about 14 miles an hour. This, again, is surpassed by the flying proa of the Ladrone Islanders, a boat with two hulls of unequal size. The larger hull, which carries all the rigging, is perfectly flat on one side and rounded on the other. On this are placed bamboo poles projecting beyond the rounded side, and to their ends is fastened a boat-shaped log one-half or one-third the size of the larger hull. This prevents capsizing as effectually as the Fiji double canoe. Both ends of the proa are made alike, and the boat is sailed with either end first; but the out-rigger is always to windward. Against a head wind the proa is kept away till the stern approaches the wind, when the yard is swung round, and what was the stern becomes the bow. Proas are from 40 to 65 feet long and 6 or 7 feet wide.

and are said to attain a speed of 20 miles an hour.

Double boats, or catamarans, have often been built in the United States, but have almost always proved very slow, because the water between the two bows is compressed into a narrowing space and offers great resistance. This defect is illustrated in the English twin-steamer *Castalia*, which, in spite of her great engine power, was a slow boat. Another example of the steam catamaran is the *Henry W. Longfellow*, built about 1880. Two iron cylinders 200 feet long, shaped like cigars, sharp at both ends, were fastened to each other at a distance of 9 feet. On them rested a deck 125 feet long, like a ferryboat. She could carry 475 passengers, had 500 horse-power, a displacement of 75 tons, and her entire weight was only 43 tons. In 1876 the *Amaryllis* was designed and built by Herreshoff. She consisted of two slender tubes connected by cross-beams loosely fastened together, and supporting a deck hardly more than large enough for two men. She was entered at the Centennial Regatta, at New York, and easily beat all competitors, but was ruled out on account of her construction. In spite of her great speed, she was very uncomfortable and very unsafe. In 1877 Herreshoff patented a double-hulled boat combining the greatest stability with the least weight. The hulls were united by ball-and-socket joints, which obviated the unevenness in position of the two hulls in a rough sea, and were set 16 feet apart, each having a centre-board and rudder. The boat had a sloop rig, and with a strong wind abeam and a smooth sea made 20 miles an hour. Many catamarans have been built since, but generally with rigid connections, and prove unsatisfactory in rough water. In a racing catamaran 25 feet long, the proportion is one foot canvas to eight pounds of water displacement. This shows the sailing powers of the catamaran. If in construction iron cylinders were used, in shape like the hulls of the flying proa, and placed with the flat sides toward each other, great speed would be secured with safety. Under proper conditions the catamaran is well adapted to summer sailing in smooth waters, being easy to handle, fast, and safe. In the United States Navy the term catamaran is sometimes applied to the balsa (q.v.), or to a float used for the men who clean the ship's side along the water-line.

CATAMARCA, kä′tȧ-mär′kȧ. A western province in Argentina, lying at the foot of the Andes and occupying an area of 47,531 square miles (Map: Argentina, D 9). The province is intersected by several mountain chains and by many small streams, most of them dry in the summer, but overflowing in the winter. It contains a number of salt lakes. The valleys in the mountainous part are very fertile. Gold, silver, and copper are found, the latter in abundance, and nearly all the fruits and grains of tropical and temperate regions are grown. Population, in 1900, 99,827, mostly Indians. Capital, Catamarca.

CATAMARCA. The capital of the Province of Catamarca, Argentina, situated in a mountainous region in the extreme northwestern part of that country, about 250 miles northwest of Córdoba (Map: Argentina, D 9). It is regularly and moderately well built, and contains a fine town hall, a Franciscan monastery, a national college, and a normal school for women. There are considerable imports of European goods, and the place is a centre of distribution for a flourishing district. Dried figs, wines, brandy, and cotton are the principal articles of export. The town was founded in 1683. Population, in 1899, 7397.

CAT′AME′NIA. See MENSTRUATION.

CAT′AMOUNT (also *catamountain*, for *cat o' mount*, *cat o' mountain*, from *cat* + *o'*, of + *mount*). An indefinite term for a wildcat or panther, formerly much used in the United States (and as *gata monte* in Spanish-speaking America), but now rarely heard.

CATA′NA. See CATANIA.

CATANIA, kȧ-tä′nē-ȧ (Gk. Κατάνη, *Katanē*, Lat. *Catana*). An episcopal city and seaport on the east coast of Sicily, at the southeast base of Mount Etna, 59 miles south-southwest of Messina and 5 miles west-northwest of Syracuse (Map: Italy, K 10). It is the capital of the Province of Catania, and the third largest city in Sicily, being outranked in population by Palermo and Messina. In front of the cathedral is a fountain, with an ancient statue of an elephant, made of lava, bearing an Egyptian granite obelisk. In the cathedral, begun by Roger I. in 1091 with materials taken mostly from the ancient theatre, and of the original of which little besides the choir has been spared by earthquakes, is the chapel of Agatha, tutelary saint of Catania, who was put to death in 251, and whose festival is magnificently celebrated in February. In the cathedral also is the monument of the composer Bellini, a native of Catania. The Villa Bellini has an attractive garden, containing busts of Bellini and others, and a statue of Mazzini.

In summer Catania is hotter than Palermo, but in winter it is cooler, on account of the snow on Mount Etna. The city formerly had epidemics of cholera, but the sanitary conditions are now excellent and the water-supply is good. The lack of promenades and gardens renders Catania less attractive to tourists than most Italian cities, although the streets are so broad and well kept, the private and public buildings so large and well built, and the situation so attractive, that it is commonly called 'la bella.' The chief attraction is Mount Etna, which may be seen to a good advantage from the tower of San Nicola and from the Villa Bellini.

The remains of the ancient theatre, being mostly under ground, can be inspected by torchlight only. The Roman structure was erected on the foundation of the Greek edifice, which is perhaps the one in which Alcibiades's eloquence, in B.C. 415, induced the Catanians to ally themselves with Athens against Syracuse. Another ancient Roman structure is the adjacent Church of Santa Maria Rotonda. The Benedictine monastery of San Nicola, formerly one of the most beautiful in Europe, was destroyed by an earthquake in 1693 and rebuilt by 1735. The institution was suppressed in 1866. The building has since been used for military and educational purposes. Its grand baroque church contains a famous organ by Donato del Piano, with 5 keyboards, 72 stops, and 2916 pipes; the museum contains antiquities in pottery, bronze, and marble, mediæval armor, and natural-history specimens; the library contains

20,000 volumes and 300 MSS., and the observatory is associated with that on Mount Etna. Under the Carmelite Church all' Indirizzo is an ancient Roman bath almost completely preserved, and not far from it is a spring probably fed by the underground Amenanus, that emerges just before emptying into the harbor. The university (founded in 1444) has about 1000 students (formerly over 2000), a school of pharmacy, a library of over 90,000 volumes (founded in 1755), and a fine collection of shells. The Academy of Natural Sciences (founded in 1823) has always been active in promoting the investigations of naturalists in Sicily.

The surrounding country, on account of its fertility, has been called the 'granary of Sicily,' and produces grain, hemp, flax, silk, cotton, wool, licorice, fruit, wine, and oil. It also has sulphur and salt mines and marble-quarries, and Mount Etna supplies snow. The fisheries are extensive. The principal manufactures of Catania are linen, cotton, and silk goods, and objects in lava, wood, marble, and Sicilian amber. The terra-cotta figures of Sicilian peasants are interesting. Commercially the city is active, is the residence of a United States consul, and has regular communication by steamboat with the other ports of Sicily and of Italy, and with the eastern Mediterranean.

The classic Catana was founded by Greeks from Chalcis about B.C. 729, and soon became prosperous. Here, in the Sixth Century, B.C., died Stesichorus, who created the chorus of the Greek drama, and the situation of whose tomb is said to have given name to the Piazza Stesicorea. In B.C. 476 the town was depopulated by Hiero I. and renamed Etna, receiving a new population of Syracusans and Peloponnesians, who were, however, expelled in B.C. 461. In the war between Athens and Syracuse, Catania was the Athenian headquarters. In B.C. 403 it was sacked by Dionysius; in B.C. 396 it was captured by the Carthaginians; and it was one of the first Sicilian towns acquired by the Romans, under whom it flourished greatly. It suffered during the Servile and the Civil wars. It was taken from Belisarius by the Goths, plundered by the Saracens, fortified by the Normans, and in A.D. 1169 almost destroyed by an earthquake. Being restored and in 1232 equipped by Frederick II. with the fortress of Rocca Orsina, it flourished under the Aragonese rulers of the Fourteenth Century. On March 8, 1669, in a terrific eruption of Etna, a stream of lava turned its course from the town to the harbor, which it partly filled up. Catania also suffered greatly from the earthquake of 1693. Most of the ruins here were excavated by Prince Biscari in the Eighteenth Century, and his collections, studied by Goethe in 1787, can be seen in the Museo Biscari. Population, in 1881, 100,000; in 1901, 146,504.

CATANIA. A gulf on the east coast of Sicily, extending in the form of a semicircle from Acireale to Cape Santa Croce, near Augusta, a distance of 18 miles (Map: Italy, K 10).

CATANZARO, kä'tän-zä'rō. An episcopal city in southern Italy, capital of the province of the same name, beautifully situated on a rocky hill, 8 miles from the Gulf of Squillace, near the southern extremity of the Italian Peninsula (Map: Italy, L 9). The climate being cool and healthful in summer, many wealthy families reside here. The castle was built by Robert Guiscard; the provincial museum contains numerous antiquities and paintings, and the cathedral is not without architectural merit. The country is luxuriant with olive groves, and the town has silk and velvet factories. Population, in 1881 (commune), 29,000; in 1901, 32,000.

CAT'APLASM. See POULTICE.

CAT'APULT, or **CAT'APUL'TA** (Lat., Gk. *καταπέλτης*, *katapeltēs*, from Gk. *κατά*, *kata*, down + *πάλλειν*, *pallein*, to brandish). An engine of war used in ancient times for projecting stones, long darts, or javelins. There were different kinds and sizes of catapults, to which various names were given. The catapult was less powerful than the balista, but more uniform in its range. Catapults were used occasionally in the latter part of the Eighteenth Century. There was one erected at Gibraltar during its siege by General Melville, for the purpose of throwing stones a short distance over the edge of the rock in a particular space frequented by the Spaniards where they could not be annoyed by shot or shell. For illustration, and its position in the development of artillery, see ARTILLERY.

CATARACT. See WATERFALL.

CATARACT (Fr. *cataracte*, Lat. *cataracta*, from Gk. *καταῤῥάκτης*, *katarrhaktēs*, waterfall, from *κατὰ*, *kata*, down + *ῥηγνύναι*, *rhēgnynai*, to break; or less probably from *ἀράσσειν*, *arassein*, to dash in pieces). An opaque condition of the lens of the eye or of its capsule. It is readily distinguished from opacities of the cornea, or clear front part of the eye, by its position just behind the pupil—that round and varying aperture in the iris through which light is admitted into the back of the eye. Cataract is called *primary* when independent of other disease of the eye, and *secondary*, or complicated, when the reverse is true. The opacity of the capsule of the lens or of the lens itself, following operations for cataract, is known as secondary cataract or after-cataract. Cataract may effect the lens alone (*lenticular cataract*), or the front or back of the capsule of the lens (*capsular cataract*), or both lens and capsule (*capsulo-lenticular cataract*). A cataract is called *partial* when limited to a portion of the lens; *complete* when involving the whole; *stationary* if it remains partial; *progressive* if it tends to include the entire lens. The last is either *senile*, *congenital*, *juvenile*, or *traumatic*. In patients under thirty-five years of age cataracts are soft and white, and are called *soft cataracts*. In older persons the nucleus is hard and yellowish, and then the term *hard cataract* is applied. The whiteness of a cataract may vary from the color of half-boiled white of egg to that of snow. Heat will produce a like change on the lens removed from the body, just as it changes white of egg from transparent to opaque. The round lens of the fish is seen at table in this opaque condition.

Cataract is painless and unaccompanied by inflammation. It occasions blindness simply by obstructing the passage of the light; but cataract alone does not produce so complete blindness but that the patient can tell light from darkness. The catoptric test, now disused, was an ingenious method of distinguishing incipient cataract from certain other deep affections of the eye. When a lighted candle is held before the eye of a person whose back is to the window, three candles are seen in the healthy eye. Two are erect—the large front one caused by the convex cornea, the smaller and fainter one behind by the convex front of the lens. The third, occasioned by the concave back of the lens, is in the middle; it is small, bright, and is upside down; when the candle is moved it goes in the opposite direction, while the two erect images move with the candle. When the back of the lens becomes opaque, the inverted image is obscured or disappears, and when the front of the lens is affected only the great front image, caused by the cornea, remains. At the present time cataract is accurately detected by concentrating light upon the eye and illuminating its interior by means of the ophthalmoscopic mirror, the eye being previously dilated by some mydriatic, such as atropine or homatropine. No difficulty then arises in determining at once the nature of the disease.

No medical or other treatment has any influence in arresting the progress of cataract, nor can it be cured except by surgical operation. A clever imposture used to be practiced by quacks. By applying belladonna to the eye—as the surgeon does when he wishes to dilate the pupil for an examination or operation—some little light was temporarily admitted through the less opaque edge of the lens. The patient, beginning to see somewhat better, after long and increasing dimness of vision, began to congratulate himself on a cure. The quack, of course, hastened to get his money without waiting for the further result, which was sure to be blank disappointment.

Traumatic cataract results from a perforating wound of the capsule of the lens. The entire lens becomes opaque, and a portion of it usually remains so; but at times, unless inflammation of other portions follows, the cloudiness entirely disappears. Congenital cataract is due to imperfect development or intra-uterine inflammation. Juvenile cataract may be hereditary, or its cause unknown. In both congenital and juvenile cataract the lens is soft and white. They are treated by 'needling,' an operation in which a needle-like knife is employed to cut and break up the lens at several operations. The injured lens is then absorbed. Senile cataract, the most important form, usually occurs in persons over fifty, and generally involves both eyes. Its period of development may be a few months or many years. Beginning in the form of gray streaks extending from the periphery toward the centre of the lens, or as spots in any portion, it may eventually render the entire lens opaque. As the fluid of the lens is then absorbed, it becomes easily separated from its capsule, and is known as ripe for operation. If neglected, other changes may take place, making the results of operation poorer, from opacity of the capsule, etc. The only method of relieving senile cataract is extraction of the lens, with or without excision of a portion of the iris. The cornea is opened along a little less than half its circumference, the capsule of the lens is cut, and the lens is expelled by gentle pressure. Great care must be used in the dressing and later treatment to avoid accidents. After removal of the cataract, the natural lens being absent, its place must be supplied by strong glasses.

CATARMAN, kä′tär-män′. A town of Samar, Philippines, situated 93 miles from Cathalogan. Population, 11,000.

CATARRH (Fr. *catarrhe*, Lat. *catarrhus*, from Gk. *κατά*, *kata*, down + *ῥεῖν*, *rhein*, to flow). A disease of great frequency in temperate latitudes, especially in changeable, moist climates, in the winter season. It is characterized by an increase in the mucus naturally flowing from the mucous membrane, preceded by a congestion and a brief period of dryness. Popularly a catarrh is called a cold, from the erroneous idea that it is due to a lowering of the temperature. More often it follows being overheated or breathing foul air, checking of perspiration, or constipation. Catarrh may affect the nasal passages (rhinitis), the throat (pharyngitis), the vocal cords and neighboring parts (laryngitis), the membrane covering the eyeball and lining the eyelids (conjunctivitis), the stomach (gastritis), the bowels (enteritis), the urinary bladder (cystitis), the bronchi (bronchitis), and other tracts lined by mucous membrane. Each of these forms of catarrh is treated under its own name.

CATARRH, EPIZOÖTIC. See EPIZOÖTY.

CATARRH, NASAL. See GLANDERS.

CATAS′TROPHISM (Fr. *catastrophisme*, from *catastrophe*, Lat. *catastropha*, Gk. *καταστροφή*, *katastrophē*, overthrow, from *κατά*, *kata*, down + *στροφή*, *strophē*, a turning, from *στρέφειν*, *strephein*, to turn). The doctrine that the vast changes which the earth has undergone from the beginning to the present time were caused by the sudden action of powerful physical agencies. This hypothesis was maintained by some of the earlier geologists to explain the physical features and structure of the earth's crust; the upheaval of mountains, and the elevations and depression of land-areas were considered to be catastrophic phenomena. Its advocates also claimed that the changes which have taken place in life forms cannot be explained fully by the theory of evolution and natural selection as taught by Darwin, Huxley, and others. The doctrine of catastrophism has met with strong opposition from leading scientists, and its application in geology is no longer recognized. One of the ablest opponents was Sir Charles Lyell, who made use of the forces and processes working at the present time to explain the geological history of the earth (uniformitarianism). Consult Lyell, *Principles of Geology* (London, 1875).

CATAUXI, kȧ-touks′ē. A naked cannibal tribe of uncertain stock, living on the middle Purus River in western Brazil. They are said to be remarkably handsome and of light complexion. They cultivate manioc, make pottery, use the blowgun with poisoned arrows, and powder the roasted seeds of *Acacia niopp* for use as a narcotic stimulant.

CATAW′BA. An Eastern tribe of Siouan stock, formerly holding a large district on the river of the same name in South and North Carolina. They were once the ruling tribe of South Carolina, numbering 1500 warriors, or perhaps

6000 souls, but by the inveterate hostility of the Tuscaroras and other Northern tribes, with intemperance and smallpox, they declined rapidly, and in 1743 were reduced to less than 400 men in spite of the fact that they had incorporated several smaller tribes. In nearly all the early wars, including the Revolution, they fought on the American side. About 100, of whom a few speak their ancient language, still reside on a small State reservation on Catawba River, in York County, S. C.

CATAWBA, or Great Catawba River. See Wateree River.

CATBALOGAN, kȧt-bä'lô-gän'. The capital of the island Province of Samar, Philippines, situated on a small bay on the western coast (Map: Philippine Islands, J 8). It lies 338 miles southeast of Manila, with which it carries on a considerable trade in hemp and cocoanut oil. Population, in 1898, 6459.

CATBIRD. In the United States, a common and familiar songster (*Galeoscoptes Carolinensis*), nearly related to the mocking-bird. It is about nine inches long, slate-gray in color, the crown and tail black. It is found in most of North America and is a general favorite. Although its call-note resembles the mewing of a cat, its spring song is one of the most varied and brilliant heard in American woods; the bird is also a mimic. It feeds chiefly upon insects, nests in bushes, and lays four or five dark greenish-blue eggs. Although a migrant in the North, it breeds and also winters in the Southern States. It is usually to be found in gardens, along roadsides, and in bushy pastures. In Australia the bower-birds, especially *Ailuradus crassirostris*, are called catbirds because of their mewing notes.

CATBOAT (Icel. *kati*, small boat + *boat*). A small sailboat, usually not more than 30 feet in length, rigged with a large fore-and-aft mainsail only, set on a boom and gaff, and having the mast stepped as far forward as possible. Such a rig as this is called a *cat-rig*. Catboats are very quick working and are easily handled by one person, which quality has made them very popular. They usually draw but little water, depending on a centre-board to prevent their making leeway, and have great beam in proportion to their length.

CATCH (probably because the voices caught up the words in turn). A species of musical composition peculiar to England, without accompaniment and set to humorous words. The music is generally for three voices and in the canon (q.v.) style. As in the canon, each voice takes up the subject at a certain distance after the preceding has begun. One of the best specimens of a catch is by Calcott, on Hawkins's and Burney's histories of music, where the humor lies in one of the parts repeating 'Burney's history'—sounding like 'burn his history'—while the others are advocating Hawkins. See Round.

CATCH-DRAINS, or Catch-Water Drains. Open drains constructed along a declivity to intercept and carry off surface water. The name is particularly applied to a drain which is built to separate a district requiring artificial drainage from surrounding higher land, in order to keep the surface water from the higher land from running into it and so increasing the amount of water to be removed from the low land. In Holland this is accomplished by a dike and canal called 'ungvart.' See Drainage.

CATCHFLY. The common English name of several plants of the order Caryophyllaceæ—which being clammy, in consequence of a peculiar exudation, on the calyx, on the joints of the stem, often prove fatal to insects settling upon them. The most common American species of catchfly are Silene Virginica, Silene regia, Silene rotundifolia, and Silene antirrhina. European species are Silene armeria, angelica, and Lychnis viscaria. Dionæa muscipula is also sometimes called the Carolina catchfly or Venus fly-trap. See Dionæa; Lychnis; Silene.

CATEAU-CAMBRÉSIS, kä'tō' käN'brā'sē', Le. A town in the Department of the Nord, France, on the Selle, 14 miles east-southeast of Cambrai (Map: France, K 1). It manufactures shawls, merinos, silks, calicoes, and leather; has breweries and distilleries; and a considerable trade in iron, coal, and wine. Population, in 1901, of town, 10,297; of commune, 10,594. The place derives its name from the château (now occupied as a factory) built by Herluin, Bishop of Cambrai, in the Eleventh Century. The treaty of Cateau-Cambrésis (q.v.) between France, England, and Spain was signed here on April 3, 1559.

CATEAU-CAMBRÉSIS, Treaty of. A treaty of peace concluded April 2-3, 1559, by Henry II. of France with England and Spain. It confirmed the French in possession of Calais, which they had wrested from the English in 1558, after the latter had held it for more than 200 years. France surrendered her conquests in Savoy and Italy, but was allowed to retain the Three Bishoprics—Metz, Toul, and Verdun. The Treaty of Cateau-Cambrésis marks the definite abandonment on the part of France of the policy of Italian conquest initiated by Charles VIII. in 1494.

CATECHETICAL (kăt'ē-kĕt'ĭ-kal) **SCHOOLS** (Fr. *catéchétique*, from Gk. κατηχητικός, *katēchētikos*, instructive, from κατηχειν, *katēchein*, to instruct orally, from κατά, *kata*, down + ἠχεῖν, *ēchein*, to sound, from ἠχή, *ēchē*, sound). The name given to the ancient Christian schools of theology, of which the chief were those of Antioch (160-400) and Alexandria (c.200-500). Clement (q.v.) and Origen (q.v.) were the most famous of the teachers in the latter; Theodore of Mopsuestia (q.v.) of the former.

CATECHISM (Fr. *catéchisme*, Lat. *catechismus*, from Gk. κατηχίζειν, *katēchizein*, to catechise, from κατηχεῖν, *katēchein*, to instruct orally, from κατά, *kata*, down + ἠχεῖν, *ēchein*, to sound, from ἠχή, *ēchē*, sound). A system of teaching by means of question and answer, employed for popular instruction in the truths and duties of the Christian religion. The composition of the first catechisms was, in all probability, suggested by the ordinary oral instruction of catechumens, and was intended for the help both of teachers and pupils. It appears to have been in the Eighth and Ninth centuries that the first regular catechisms were compiled, of which that by Kero, a monk of Saint Gall, and that ascribed to Otfried of Weissenburg, are among the most noted. At later periods the use of catechisms prevailed chiefly among the opponents of the hierarchy, as among the Waldenses, the Albigenses, the Wicliffites, and, above all, among the

Bohemian Brethren. (See the articles on these sects in this Encyclopædia.) The term catechism appears to have been first employed in its present sense among the last-named. At an early period in the history of the Reformation, the reformers began to avail themselves of this method of popular instruction, and their catechisms became important instruments in that great religious movement. In 1520 Luther published his first short catechism. In 1525 Justus Jonas and John Agricola were intrusted with the preparation of a catechism. In 1529 Luther published his larger and smaller catechisms, which found a place among the symbolical books or standards of the Lutheran churches. A number of catechisms were published also by the Swiss reformers, and by those of England and other countries. The Geneva catechisms, larger and smaller, were the work of Calvin. They were published in 1536, were speedily translated into various languages, and became acknowledged standards of the Reformed churches, not only in Switzerland, but in the Netherlands, in France, and in Hungary. The Church of Geneva has set aside the authority of these catechisms. The Zurich Catechism is received as a standard in the Church of Zurich. The Heidelberg or Palatinate Catechism is of greater importance, however, than any other as a standard of the German reformed churches. It was compiled by the Heidelberg theologians, Caspar Olevian and Zacharias Ursinus, at the request of the Elector Frederick III. of the Palatinate; it was published in 1563, was approved by several synods, and was subjected to a revision by the Synod of Dort. In the Church of Rome the Tridentine Catechism is of high authority. It was prepared in accordance with the decrees of the Council of Trent, by Archbishops Leonardo Marino and Muzio Calini, Bishop Egidio Foscarini, and the Portuguese Dominican, Francesco Fureiro; revised by Cardinals Borromeo and Sirlet, and sanctioned by Pope Pius V. It was published in Rome in 1566. The catechism of the Orthodox Greek Church was prepared by Peter Mogilas, metropolitan in Kiev, and published in 1642. It received authority as a standard or symbolical book from a synod in Jerusalem in 1672. It is often called the Larger Russian Catechism, to distinguish it from the Smaller Catechism prepared by order of Peter the Great. Besides these catechisms, which have a historic interest, or are of importance from their symbolical character, there have appeared at all periods since the Reformation many others, both Protestant and Roman Catholic, some doctrinal, some controversial, some devoted to particular subjects, as the sacraments, or to particular purposes, as the preparation of candidates for admission to the Lord's Supper, some adapted to the mental capacity of very young children, etc.

The Catechism of the Church of England is published in the Book of Common Prayer. It is in two parts: the first contains and explains the baptismal covenant, the creed, the ten commandments, and the Lord's Prayer; the second explains the two sacraments, baptism and the Lord's Supper. It is not known with absolute certainty who was the author of the first part; probably Thomas Cranmer and Nicholas Ridley had the principal hand in framing the questions and answers. It was originally put forth with the 42 articles in the reign of Edward VI., and condemned as heretical in the reign of Mary. It must not be confounded with Cranmer's catechism, which was a larger work, differently arranged, and translated chiefly from the German catechism used in Nuremberg. This first part of the Church Catechism is spoken of as the *Shorter* Catechism. There was a *larger* Church Catechism compiled also in the reign of Edward VI., by John Ponet, as is supposed, and it corresponds in some degree with the smaller work above described. It appeared in 1553, but was afterwards revised and enlarged by Laurence Nowell, Dean of Saint Paul's, and published in 1570; and though never officially promulgated by the Church, it has some authority from having been approved by the Lower House of Convocation. At the Hampton Court Conference (1604) at the beginning of the reign of James I., the *Shorter* Catechism was considered too short, and the larger one of Nowell's too long; and accordingly, at the King's suggestion, an addition was made to the former of that explanation of the two sacraments which now forms the second part of the Church Catechism. This was drawn up by Rev. Dr. John Overall. The rubrics in the Common Prayer Book enjoin the teaching of the Catechism in the church on Sundays and holy days after the second lesson at evening prayer; the 59th canon contains a like injunction, imposing penalties on the clergy who neglect this.

The Larger and the Shorter Catechisms, which, with the Westminster Confession of Faith, constitute the standards or symbolical books of the English-speaking Presbyterian churches, were compiled by the Assembly of Divines at Westminster; the Shorter Catechism "to be a directory for catechising such as are of weaker capacity;" the Larger, "for catechising such as have made some proficiency in the knowledge of the Christian religion." The Shorter Catechism was presented to the English House of Commons on November 5, 1647; the Larger on April 14, 1648; and in July, 1648, both received the sanction of the General Assembly of the Church of Scotland, which, in the act of approving of the Larger Catechism, declared it to be "a rich treasure for increasing knowledge among the people of God," and that "they bless the Lord that so excellent a catechism has been prepared." The Shorter Catechism has, however, been far more generally used for the purpose of instruction than the Larger, which has been generally felt to be too minute in its statements, and too burdensome to the memory to be employed as a catechism.

CATECHU, kăt′ê-kū *or* -chū (Neo-Lat., from Kanarese, Malay *kāchu*, catechu). A substance of vegetable origin employed in tanning and dyeing, and medicinally as an astringent. In the East it is much used for chewing. The catechu of commerce is obtained chiefly from East Indian trees, such as the *Acacia catechu* and *Acacia suma*. It is known in India by the name Kutt; and catechu is said to be a name compounded of two words signifying 'the juice of a tree' (*cate*, a tree, and *chu*, juice). Cutch is another form of one or other of these two names, and is a common commercial name. Catechu is obtained from the heart-wood of the trees by cutting it into small chips, and boiling in water till the extract has the thickness of tar. It is then allowed to harden for two days, so that it will not run, and is formed into balls about the size of oranges, which are placed on husks of rice or on leaves, and appear in commerce enveloped in them. The catechu manufacturers in northern India move to different parts of the country at different seasons, and erect temporary huts in the jungles, where they carry on their operations. *Pegu catechu* is the ordinary commercial variety and is used in medicine; it is soluble in hot water, in alcohol, acetic acid, and the strong alkalies; it is astringent and leaves a sweetish taste in the mouth. The active ingredients of catechu are catechuic acid or catechin, and a peculiar variety of tannic acid, of which it contains about 54 per cent. Catechu has been extensively employed in the dyeing of browns, fawns, drabs, and olives. It is much used for coloring stout canvas. See GAMBIR.

CATECHUMENS, kăt′ē-kū′mĕnz (Fr. *catéchumène*, Lat. *catechumenus*, Gk. κατηχούμενος, *katēchoumenos*, from κατηχεῖν, *katēchein*, to instruct orally). The appellation commonly given, in the early ages of the Christian Church, to those converted Jews and heathens who had not yet received baptism, but were undergoing a course of training and instruction preparatory to it. They had a place assigned them in the congregation, but were not permitted to be present at the dispensation of the Lord's Supper. In the apostolic age converts appear to have been at once admitted to the sacraments; but afterwards this ceased to be the case, and a period of probation was required. The catechumens were divided into different classes or grades, according to their proficiency. Those of the lower grade were not permitted to be present during the prayers of the congregation; and those only of the higher, and who had been declared fit to be baptized at the next administration of the ordinance, were permitted to witness the dispensation of the Lord's Supper. The term catechumens was afterwards employed to designate young members of the Christian Church who were receiving instruction to prepare them for confirmation or for the Lord's Supper, and is still often used in this sense. As the *Teaching of the Twelve Apostles* shows, from the earliest period of the Christian Church didactic instruction was given to the candidates for baptism. But an air of mystery was thrown around the sacraments, especially the eucharist, and the desire of the candidates excited by hints that there was something to be revealed. In the body of the baptized the sacraments were freely spoken of and the teaching relative to them was known as the 'Discipline of the Secret' (*Arcani Disciplina*). How much it amounted to is not now determinable, but probably it presented a full exposition of sacramental doctrine, and up to it the instructions of the catechumens led.

CATEGORICAL IMPERATIVE. A term much used by Kant (q.v.) and his followers to designate what they consider to be the absolutely unconditional character of the demands that morality makes upon every reasonable being. If we wish to preserve health we must observe the laws of hygiene, but we may not wish to preserve health. The obligation of hygienic rules is thus conditional upon a certain wish which may or may not be cherished. But whether we wish it or not, we ought to respect another man's property. This obligation is thus conceived to be absolute. For a criticism of this view, see ETHICS.

CATEGORY (Fr. *catégorie*, Lat. *categoria*, from Gk. κατηγορία, *katēgoria*, category, charge, from κατηγορεύειν, *katēgoreuein*, to accuse, from κατά, *kata*, down + ἀγορεύειν, *agoreuein*, to declaim, from ἀγορά, *agora*, assembly, from ἄγειν, *agein*, to lead). A philosophical term in use since the time of Aristotle. Aristotle used it to denote the highest classes under which all predicates of propositions concerning things can be subsumed. He recognized ten such categories, viz. substance, quantity, quality, relation, place, time, situation, possession, action, and passivity. The Hindu philosopher Kavâda is said to have treated categories in such a way as to have attained a result very much like Aristotle's. (See Thompson's *Laws of Thought*, appendix by Max Müller.) The Stoics recognized four ontological categories—substance, attribute, states, and relations. Plotinus recognized five—being, rest, motion, identity, and difference. The Scholastics accepted Aristotle's classification without any other change than to Latinize the word category into *predicamentum*, whence comes our word *predicament* in the sense of 'plight.' To be in a bad predicament is to be so circumstanced that the predicate of a judgment that adequately expresses one's situation falls under a bad class of predicates. Kant (q.v.) objected to Aristotle's classification as being uncritical, and proposed a new classification resting on the traditional classification of judgments. But Kant did more than give a new classification of categories. He introduced a new conception of their nature. They were for him *a priori* (q.v.) principles of synthesis, whereby thought brings into definite intelligible form the chaotic manifold elements of sense. Kant recognized four categories, those of quantity, quality, relation, and modality. Each of these was subdivided into three classes, with twelve resulting categories, viz. unity, plurality, totality; reality, negation, limitation; inherence and subsistence, causality and dependence, community; possibility and impossibility, existence and non-existence, necessity and contingency. (See KANT.) Hegel criticised Kant for doing what Kant criticised Aristotle for doing, and insisted that dialectic is the only method whereby the categories can be satisfactorily determined. (See DIALECTIC.) He also modified the Kantian view of categories by making them not so much forms imposed by thought on sense-contents, themselves devoid of such forms, as principles obtaining in the unitary world of thought and things. They have thus both an objective and a subjective significance. Hegel in this way embodied in his treatment of categories both the Aristotelian realism and the Kantian idealism. As a result of his dialectic method, Hegel obtained three groups of categories—being, essence, and concrete thought (*Begriff*). Each of these has many subdivisions, so that the list he gives includes something like one hundred and fifty; but he does not claim absolute accuracy or exhaustiveness for the detailed results he obtains. J. S. Mill proposed as substitute for Aristotle's classification: (1) feelings, or states of consciousness; (2) the minds which experience those feelings; (3) bodies or external objects which excite certain of those feelings; (4) the successions and co-existences, the likenesses and unlikenesses, between feelings or states of consciousness. For Mill, categories were classes of namable things. In recent times Ed. von Hartmann has written a detailed work on categories (*Kategorienlehre*, 1896). He defines a category as an unconscious *a priori* intellectual function of a definite sort. This is very much like Kant's view; but categories are not so much part of the innate constitution of each individual as they are the ways in which the impersonal reason acts in individuals. Thus in origin they are superpersonal, but as concrete functions they belong to the individualized group of functions. There are three great divisions—categories of sensation, of perception, and of thought. Each division is more or less subdivided. It will thus be seen that one's views of categories are determined by one's epistemological views. In accordance with the epistemological view developed in this work (see KNOWLEDGE, THEORY OF) a category may be defined as an intelligible relation between objects. Consult: Caird, *Critical Philosophy of Immanuel Kant* (New York, 1889); and Harris, *Hegel's Logic* (Chicago, 1890).

CATEL, kȧ'tĕl'. CHARLES-SIMON (1773-1830). A French musician, born at Laigle. In 1787, he became accompanist of the Paris Ecole Royale de Chant (at which he had previously studied under Gossec), and upon its consolidation with the new Conservatory he was made professor of harmony. He later became an inspector of the Conservatory and in 1815 was elected to the Academy. Catel's most lasting work was his *Traité d'harmonie* (1802), an excellent textbook, and long a standard in France. Of his numerous compositions, only the operas *Sémiramis* (1802) and *Les Bayadères* (1810) are of any importance.

CATEL, kä'tel, FRANZ (1778-1856). A German painter, born in Berlin. He first gained a reputation by his drawings illustrating Goethe's *Hermann und Dorothea* (1799). He then went to Paris, and afterwards to Rome, where he associated with Overbeck, Cornelius, and Schadow, who were among his friends. He showed in his manner of painting the influence of Carstens. His landscapes are of Italian scenes, with architectural details in classic style, such as the "Ruins of Pæstum" and "The Appian Way."

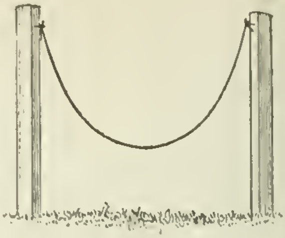
CATE'NA (Lat., chain). A commentary composed of extracts from different authors, elucidating a text, especially the text of the Bible. The authors are generally Church fathers, and so the extracts partake of the nature of an inspired commentary. The composition of such a commentary dates from the Fourth Century. Prominent among the earliest compilers is Cassiodorus (c.470-565), and most famous is Thomas Aquinas (c.1226-74). Consult the English translation of the *Catena Aurea* on the Gospels by the latter (6 vols., Oxford, n. e., 1870). Many extracts from otherwise unknown works have thus been preserved.

CATENA (properly VINCENZO DI BIAGIO) (?—c.1531). A Venetian painter. He was a pupil of Giorgione and Giovanni Bellini, and a clever imitator of these and other masters. His works include chiefly religious pictures and portraits, the most important being "Knight Kneeling Before the Madonna" (London). Other specimens are "Madonna Between Saint Francis and Saint Jerome" (Venice Academy), and a fine portrait of one of the Fugger family (Berlin).

CAT'ENARY (Lat. *catenarius*, from *catena*, a chain). The curve formed by a flexible, homogeneous, and inextensible cord hanging freely between two points of support, and acted on by no other force than gravity. If the cord is not homogeneous and the density varies, the cord hangs in a curve different in shape from the ordinary catenary; e.g. where the cord is such that the weight of any part of it is proportional to its horizontal projection, the curve is a parabola. The latter curve and the ordinary catenary are of importance in the theory of suspension bridges. The catenary is represented algebraically by the equation:

$$y = \frac{c}{2}\left(e^{\frac{x}{c}} + e^{-\frac{x}{c}}\right)$$

It possesses several remarkable properties, one of which is that its centre of gravity is lower than that of any other curve of equal perimeter, and with the same fixed points for its extremities. The catenary seems first to have attracted the attention of Galileo, who attributed to it a parabolic form. Joachim Jungius (1669) showed the error of this supposition, but was unable to determine the equation of the curve, a result accomplished by Leibnitz (1691). The curve was also elaborately investigated by Jakob Bernoulli. The bibliography of the subject is given in Brocard, *Notes de bibliographie des courbes géométriques* (Bar-le-Duc, 1897). For a discussion of the mechanical properties of the curve, consult: Price, *Analytical Mechanics*, Vol. I. (Oxford, 1868); and Minchin, *Treatise on Statics* (Oxford, 1880).



CATENARY.

CAT'ENIP'ORA (Neo-Lat. nom. pl., from Lat. *catena*, chain + *porus*, pore). A generic name given by Lamarck in 1816 to the chain coral, a peculiar tabulate coral found in a fossil state in the Silurian rocks, to which the name Halysites had already been applied by Fischer in 1806. For description, see HALYSITES.

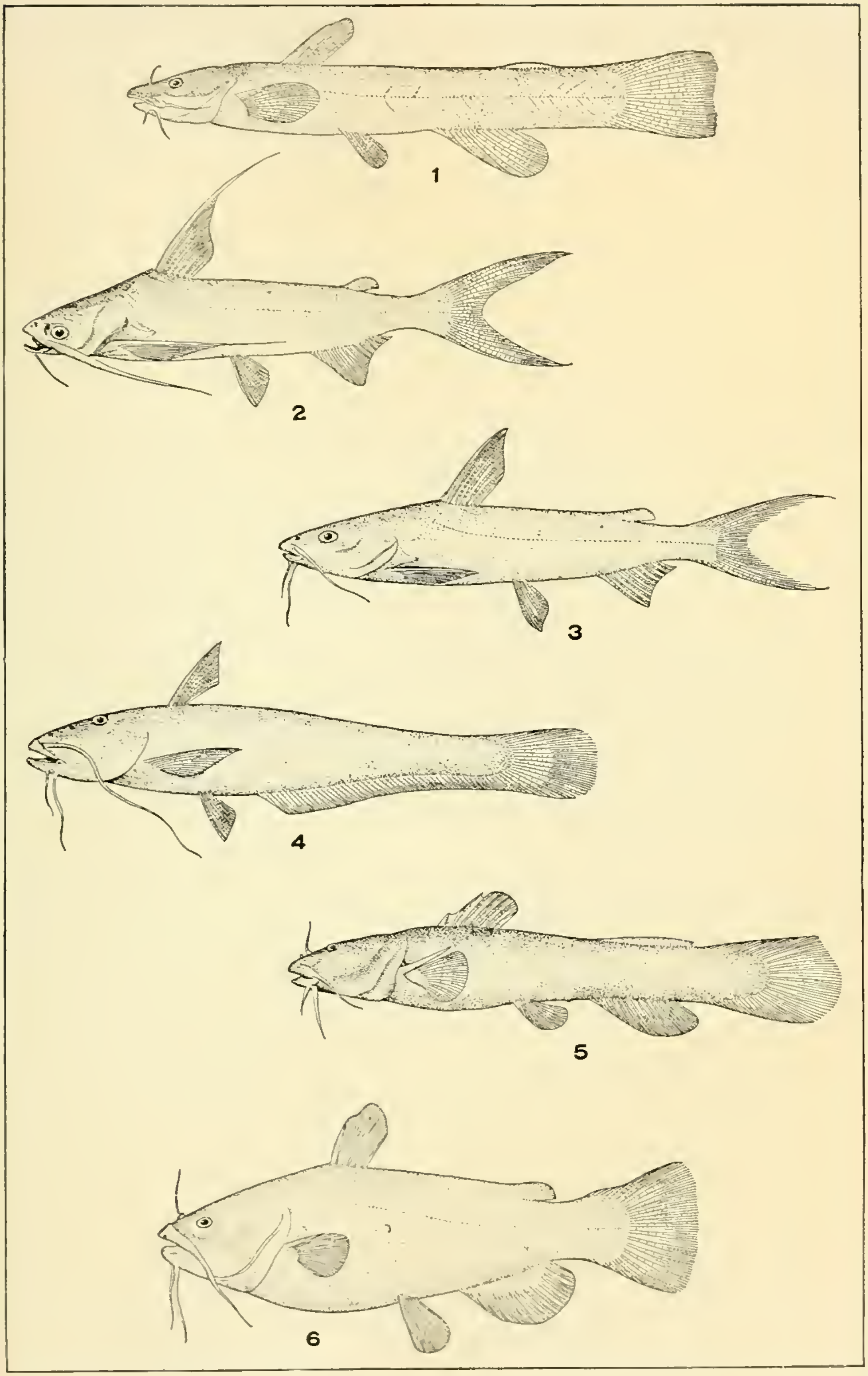
CATERPILLAR. See BUTTERFLIES AND MOTHS.

CATERPILLAR-HUNTER. A predaceous beetle of the family Carabidæ, and genus Callosoma, of which several species prey upon caterpillars, earthworms, etc. To this genus belong the bombardiers (q.v.), and many species, of which a common one (*Callosoma scrutator*) is illustrated on the colored Plate of INSECTS. See GROUND-BEETLE.

CATESBY, kāts'bĭ, MARK (c.1679-1749). An English naturalist, born probably in London. He visited North America and the Bahamas in 1712-19, and afterwards published *Natural History of Carolina, Florida, and the Bahama Islands*, with colored figures drawn and etched by himself (1722-26). These were the first drawings of North American animals to be published. He also published *Hortus Britanno-Americanus* (1737) and *Migration of Birds* (1747).

CATFISH (so called from the purring sound when the fish is taken from the water). One of

CATFISH



1. MAD TOM (Schilbeodes miurus).
2. GAFF-TOPSAIL CATFISH (Felichthys marinus).
3. SEA CATFISH (Galeichthys felis).
4. EUROPEAN CATFISH OR WELS (Silurus glanis).
5. STONE CATFISH (Noturus flavus).
6. BLACK BULLHEAD (Ameiurus melas).

a group of physostomous (soft-rayed) fishes of both salt and fresh waters, comprising the order Nematognathi and the family Siluridæ and its allies. "The fishes of this order," writes Dr. D. S. Jordan, "agree in having the maxillary bone imperfectly developed, and forming the basis of a long, fleshy feeler or barbel [and in] . . . the presence, in most cases, of additional pairs of barbels about the mouth, near the tip of the upper or the lower jaw, or both; the absence of scales and the presence in many species, especially those found in tropical waters, of bony plates. These sometimes form a more or less perfect coat of mail on the sides of the body; at other times they form a shield on the top and back of the head. Another feature is the development, in most cases, of the first ray in the dorsal and pectoral fins as a strong, stiff, sharp, serrated spine which forms an effective weapon of defense. The spines of the pectoral fins are strongest, and they are usually 'set'—that is, firmly erected—whenever the fish is caught or attacked. These spines are a source of much annoyance to fishermen, and there are few persons . . . in the Eastern States who have not had some painful experience with the 'horns' of a catfish." The wounds made by these spines often heal with difficulty, owing to the jagged nature of the cut and to the slime introduced; in one genus (Noturus), however, a poison-gland is connected with the pectoral spine. They use the spine in ugly fights among themselves. The catfishes inhabit the fresh waters and shallow coastal waters of the warmer parts of America, Africa, and the Orient, but are represented by only a single European species, the typical silurus of the Latins, and the sheatfish of English writers. (See SHEATFISH.) They vary from two inches to a dozen feet or more in length, and may exceed 200 pounds in weight. Most of them are good food, and everywhere enter into the diet of the people. In habits they are comparatively sluggish, remain close to the bottom, and are carnivorous and voracious, eating eggs and fry of aquatic animals, and seizing such fishes, amphibians, and birds as they can overcome. Few are swift swimmers, but they lurk in wait for prey, being almost invisible by reason of their dull, dark colors, and making a quick rush; consequently, the larger ones are among the most destructive enemies of aquatic life.

The North American catfishes have the skin wholly naked, and are familiarly represented by the horned pout. (See BULLHEAD.) The same genus (Amiurus) contains several other species often termed mud-cats. The stone-cats belong to the genus Noturus, are small, comparatively slender, dark-hued, and inflict poisoned wounds. Another genus, the channel-cats (Ictalurus), dwell in running streams and lakes, and include many large forms, the fork-tailed catfish of the Great Lakes (*Ictalurus lacustris*) sometimes weighing 100 pounds; while the 'white' channel-cat (*Ictalurus ponderosus*) of the Mississippi River Valley may grow to 150 pounds, and become the largest of our fresh-water fishes except the California sturgeon. An illustrated monograph of the fresh-water species, by Dr. D. S. Jordan, will be found in *Bulletin No. 10* (1877) of the United States National Museum at Washington. The sea-catfish are closely allied to the channel-cats, and two species are common along the Atlantic coast, both 2 to 5 feet long, and blue above with silvery bellies; but more than 100 species of this marine group, which haunt sandy bottoms near shore and furnish poor food, are scattered through the tropics, especially in the East Indies.

The South American fresh waters abound in catfishes of the genus Pimelodus and its allies, the largest species of which is the leopard-cat, or suravi (*Pimelodus frati*), from rivers of Argentina and Uruguay, which is 6 to 7 feet long, and yellow, spotted with black. Another characteristic South American group is that of the mailed cats, of the genus Callichthys, in which the body is almost entirely covered by four rows of large, hard, narrow, scaly plates, two rows on each side, and the head is well covered with bony plates. They are said to be able to make their way over land from a pool which may be drying up to another some distance away; sometimes they bury themselves in the mud of wet meadows. They build their nests near the margin of the water, at the beginning of the rainy season, both sexes guarding them until the eggs are hatched. The genera Doras, Loricaria, and Arges are allied groups of many species. Africa abounds in fishes of this family, of which the best known is the bayad (q.v.) of the Nile. A different Nile catfish (*Malapterurus electricus*) has the power of delivering an effective electric shock. (See ELECTRIC FISHES.) Many other species, some of large size, having the general characteristics outlined above, haunt the sluggish rivers and estuaries of India, Siam, China, and the larger islands thence to Australia, with varying importance as food. Among these is notable the eel-like genus Clarias, 'eel-pouts,' about thirty species of which are known, some reaching 6 feet in length. The catfishes are known as fossils well back into the Tertiary.

The name is applied to various fishes of other families; as, in England, to the wolf-fish (*Anarrhichas lupus*), the cusk, and one or more small sharks. In Australasia the star-gazers (Kathetostoma) are called catfish, and elsewhere the chimæras are called 'sea-cats.'

CATGUT (probably a corruption, by popular confusion with *kit*, cat, of *kit*, fiddle, apparently from AS. *cytere*, from Lat. *cithara*, Gk. κιθάρα, *kithara*, guitar, and *gut*, Ger. *Gotte*, gutter, from AS. *géotan*, Got. *giutan*, Ger. *geissen*, Lat. *fundere*, Gk. χεῖν, *chein*, to pour). A substance employed in the manufacture of the strings of violins, harps, guitars, and other musical instruments, and also used for the cords carrying clock-weights, in the bows of archers, and for whip-cord. It is generally prepared from the intestines of sheep, rarely from those of the horse, ass, or mule, but never from those of the cat. The first stage in the operation is the thorough cleansing of the intestines from adherent feculent and fatty matters, after which they are steeped in water for several days, so as to loosen the external membrane, which can then be removed by scraping with a blunt knife. The material which is thus scraped off is employed for the cords of battledores and rackets, and also as thread in sewing the ends of intestines together. The scraped intestines are then steeped in water and scraped again, treated with a dilute solution of alkali (4 oz. potash, 4 oz. carbonate of potash, and three to four gallons of water, with occasionally a little alum), drawn through a perforated brass thimble, and assorted into their respective sizes. In order to destroy any adherent animal matter, which would lead to putrefaction and the consequent development of offensive odors, it is customary to subject the catgut to the fumes of burning sulphur (sulphurous acid). The best strings are used for musical instruments, and those which come from Italy and are known as *Roman strings* are the strongest. They are remarkable for their clearness and transparency. The surgeon also uses the best grades of catgut in closing wounds. Cords for clock-makers are made split longitudinally into several lengths. Whip-cord is made from catgut which has been twisted in a manner somewhat similar to single-corded ropes.

CATH'ARI, or Catharists (Med. Lat., from Gk. *καθαρός, katharos,* pure). A name very generally given to various sects which appeared in the Church during the Middle Ages. It appears to have been sometimes assumed in profession of a purity of doctrine and morals superior to that which generally prevailed in the Church, sometimes bestowed ironically in ridicule of such a profession, and was used as a designation of the Paulicians (q.v.) of the Seventh and succeeding centuries, of sects which appeared in Lombardy in the beginning of the Eleventh Century, and afterwards in France and the west of Germany, and of the Bogomiles of the Twelfth Century. In the Eleventh Century the Patarenes appeared in Milan, and were called Cathari. The names Albigenses and Cathari are often used as equivalent to one another; in fact it is almost impossible to differentiate the various bodies known as Petrobrusians and Arnoldists (from their leaders), or Passagers and Publicans (from different features of their morals and customs). Manicheism, Gnosticism, and Montanism are ascribed to the Cathari; but as their doctrines were a confused agglomeration of different heresies, and consequently the descriptions of contemporary writers are not always concordant, it is difficult to make out their system in detail. It appears quite certain that the Cathari differed among themselves in their doctrines, and in the degree of their opposition to the dominant Church. Some of them advocated and practiced a rigid asceticism. There is no good evidence that any of them nearly approached to the doctrines of the Reformation, although in their rejection of tradition, of the authority of Rome, of the worship of saints and images, etc., there are notable points of agreement with the views of the reformers. Consult C. Schmidt, *La secte des Cathares* (Strassburg, 1849); J. J. Döllinger, *Sektengeschichte,* Vol. II. (Munich, 1890); also H. C. Lea, *History of the Inquisition* (3 vols., New York, 1888).

CATH'ARINE (Fr. *Catherine,* Lat. *Catharina,* Gk. Καθαρίνη, *Katharinē* from καθαρός, *katharos,* pure). The name of six saints of the Roman Catholic Church. The simple designation of *Saint Catharine,* however, is given to a virgin said to have been of royal descent in Alexandria, who, publicly confessing Christianity at a sacrificial feast appointed by the Emperor Maximinus, was put to death in A.D. 307, after being tortured on a wheel. Hence the name of 'Saint Catharine's wheel.' Very remarkable legends exist as to her converting 50 philosophers sent by the Emperor to convert her in prison, besides a multitide of other persons; the conveyance of her head by the angels to Mount Sinai, etc. She is regarded as the patroness of girls' schools. Her day is November 25 or March 5. (See her life in the publications of the Early English Text Society; also in those of the Roxburghe Club, both London, 1884).—Saint Catharine of Siena, daughter of Jacomo Benineasa, a dyer of Siena, was born there in 1347; practiced extraordinary mortifications, and was said to have been favored with especial tokens of favor by Christ, whose wounds were impressed upon her body. (See Stigmatization). She became a Dominican, and died in Rome, April 29, 1380. She wrote devotional pieces, letters, and poems, which have been more than once printed; the best edition appeared in Siena and Lueca, in 1707-54 (in 5 vols., 4to), under the title of *Opere della serafica Santa Catarina.* Her letters were published in French translation (Paris, 1854; best in the original, Florence, 1860, 4 vols.). In English have appeared *Dialogues of the Seraphic Virgin Catherine of Siena* (London, 1896); the dialogue *De Perfectione* is translated in Miss Drane's biography mentioned below. Consult her life by J. E. Butler, 4th ed. (London, 1895); Augusta I. Drane (London, 1880); M. A. Mignety (Paris, 1886); A. T. Pierson (New York, 1898); H. V. Redern (Schwerin, 1900).

Saint Catharine of Genoa was born in 1447 of the distinguished Genoese family Fieschi. Her father was viceroy of Naples under René of Anjou. She was very beautiful. Her own wish was to become a nun, but her parents gave her in marriage to a Genoese nobleman, Giuliano Adorno (January 13, 1463), in order to heal the breach which had come between the two families. Her married life was unhappy, and she suffered much not only from her husband's personal treatment, but from his extravagance and licentiousness. At last bankruptcy overtook him and they were reduced to poverty. Then her spiritual nature showed itself. She started on a career of philanthropy as nurse (1479), and from 1491 to 1497 was chief nurse in a great hospital. Her husband was converted through her influence, entered the third order of Saint Francis, and joined her in charitable labors. Her ascetic piety was extraordinary. It is said that from 1478 to 1500 she fasted all Advent and all Lent, and took no nourishment of any kind, but drank water mingled with vinegar and salt. She died September 15, 1510, having won so high a reputation for piety that Pope Clement XII. canonized her in 1737; and Benedict XIV. put her in the Martyrology under March 22d; but in the *Acta Sanctorum* she is found under September 5th. She had many ardent disciples and one of them wrote from her lips, in Italian, *The Treatise on Purgatory* (English trans., London, 1878). Her life, written by T. de Bussierce, prefaced a French translation of her works (Paris, 1860).

Saint Catharine of Bologna and Saint Catharine of Sweden (1331-81), the fourth daughter of Saint Birgitta (or Bridget) of Sweden, are of less note.

CATHARINE I. (? -1727). Mistress and wife of Peter the Great, and Empress of Russia from 1725 to 1727. She was born between 1682 and 1685, the daughter of a Lithuanian peasant, Samuel Skavronski, or perhaps of a Baltic nobleman, Colonel Rosen. Her mother was undoubtedly a serf. She was brought up as a foundling by the pastor Glück, at Ringen and Marienburg, in Livonia, and was married to a dragoon, who was immediately ordered into active service. At the taking of Marienburg by the Russians, in 1702, Glück threw himself and his family on the mercy of the Russian commander. Sheremetieff, who was attracted by the beautiful face of the young peasant girl, and kept her with him when the other captives were forwarded to Moscow. A few months later Menshikoff, the favorite of Peter, saw her, and took advantage of his rank and power to deprive Sheremetieff of his prize, only to be in turn despoiled by Peter himself. With a figure and bearing that bore testimony to her ignoble birth, she seems nevertheless to have had in her face a peculiar charm, and unlettered though she was, she possessed an active and practical mind that appealed to Peter. She became his most influential adviser and confidant, exercising over this man of iron will and violent passions an influence such as no other person had. Peter profited by her resourceful intellect in the campaign against the Turks in 1711, and the colored accounts that have come down to us represent her as having saved the Czar and his army when they were hemmed in at the river Pruth by bribing the Grand Vizier with jewels and money. In recognition of her services, Peter founded the Order of Love and Fidelity, or of Saint Catharine, for women, and in 1712 made Catharine his wife. By a ukase of 1721 the Czar proclaimed his right to designate his successor, and in 1724 Catharine was crowned Empress. An intrigue which she carried on with one of the chamberlains of the royal household aroused Peter's jealousy, but he spared her life, and after his death, February 8, 1725, it was alleged by Menshikoff and others that he had at the last moment forgiven the Empress and carried out his earlier intention of designating her as his successor. The claims of the grandson of Peter by the son of his first wife were set aside, although maintained by the Old Russian party, and Catharine became Empress. Of her brief reign Menshikoff was the controlling spirit. As Empress, Catharine lived a life of dissipation. Her death, which occurred on May 17, 1727, came suddenly. She had eight children by Peter, all of whom died in infancy except two daughters, Anna and Elizabeth. The latter afterwards became Empress. There are studies and memoirs in Russian and French bearing upon the life of Catharine I. A good list may be found in Lavisse and Rambaud, *Histoire générale*, Vol. VII. (Paris, 1896). Consult, also Schuyler, *Peter the Great* (New York, 1884).

CATHARINE II., THE GREAT (1729-96). Empress of Russia from 1762 to 1796. She was born at Stettin, May 2, 1729, the daughter of the Prince of Anhalt-Zerbst, and was baptized a Lutheran under the name Sophia Augusta. She was chosen by the Empress Elizabeth (q.v.) of Russia for the wife of her nephew, Peter of Holstein-Gottorp, heir to the Russian throne, and was rebaptized into the Greek Church by the name of Catharine. She was married in 1745. Thrown at the age of sixteen into the intrigues of the coarse and immoral Russian Court, Catharine adapted herself with singular readiness to her surroundings. Indifference to her husband soon became contempt and hatred. While Peter alienated the Russians by his obstinate admiration of all things German, Catharine became a Russian of the Russians, and, anticipating the great part she was later to play, attached to herself a strong party, through her tact and matchless influence over men. Peter openly maintained a mistress, subjecting his wife to constant indignities, and Catharine's relations were equally notorious, at first with Count Soltikoff, and afterwards with Count Stanislas Poniatowski. The Empress Elizabeth died in 1762 and Peter became Emperor. He now threatened to divorce Catharine, to declare her son Paul illegitimate, and to marry his mistress, the Princess Vorontsoff. Catharine, assisted by the Orloffs, the Princess Dashkoff (q.v.), and others who had long formed about her a coterie of conspirators, headed a rising of the troops in Saint Petersburg, and, aided by the dilatoriness and weakness of Peter, and his unpopularity, secured all the instruments of power, and was declared Empress of Russia. Peter was seized and imprisoned, and was probably strangled by Gregory Orloff, Catharine's favorite at the time (July, 1762). As Empress, Catharine gave close personal attention to the work of government, and by liberal expenditure and the patronage of letters and art made her Court one of the most brilliant in Europe. It has been said that she found Saint Petersburg a village of hovels and left it a city of brick and marble. Regarded at first as a usurper by the European governments, she compelled their recognition by the vigor of her policy. In 1780 she announced the principle of armed neutrality as an offset to the British treatment of neutrals, and, by securing the adhesion of other States, fixed in international law the principle of 'free ships, free goods.' See INTERNATIONAL LAW.

The gross immorality of her private life was as notable as her administrative energy. Russia borrowed what culture it had from France, but at the same time the immoral life of the French Court was reduced to a system in Russia. The rule of all the Empresses after Peter the Great was notorious for the influence possessed by favorites, but Catharine's wholesale methods are almost unique in history. She had a succession of recognized lovers, beginning with the brutal and domineering Gregory Orloff, who maintained his place until he dared to aspire to marriage with his royal mistress. After him came Vysocki, Vassilshikoff, Alexis Orloff, and then the most powerful of them all, Gregory Potemkin (q.v.). Potemkin was banished from the Court for the same presumption that led to Gregory Orloff's fall; but he was made practically Vice-Emperor for southern Russia, and continued to play an important part in the government, retaining Catharine's affection to the day of his death. These men had all possessed some force and power, and had supported Catharine in the administration; but Potemkin was followed by a series of favorites who were little more than the temporary lovers of the Empress. Soon after her seizure of the throne Catharine secured the election of her early lover, Poniatowski, to the Polish throne, and later, in alliance with Prussia and Austria, took advantage of the dissensions among the Poles to bring about the three partitions of Poland (1772, 1793, and 1795). This was only one of the steps which enabled Catharine to accomplish one of her chief ambitions—to bring Russia into direct contact with the Western world. She was indeed the truest heir to the policy of Peter the Great, in its good and its evil. The war with Turkey (1768-1774) impressed Europe with the power of Russia, and brought increase of territory, the Crimea, etc., and the free navigation of the Black and Mediterranean seas.

With all her defects of character, Catharine was one of the most remarkable rulers of modern times. Her boundless ambition and tireless energy served chiefly one aim—that of developing all the resources of Russia and transforming it into the most powerful and most splendid State of Europe. During the first twelve years of her reign, while under the influence of Orloff, her activity was almost wholly beneficent. She convoked representatives of all the provinces at Moscow, to discuss plans for reforming the administration of justice, and as a result completely reorganized the laws of the Empire. She encouraged immigration, introduced inoculation for smallpox, and other sanitary measures, established elementary schools in all the cities and many small towns, founded institutions of learning, military and naval schools and hospitals, built canals and fortresses, and sent Russian scholars and artists abroad, to profit by foreign example. The principal defect of her methods lay in her seeking to adapt to the government of a half-civilized country like Russia the principles derived from her study of French models. She invariably turned to French thinkers as her source of inspiration and was flattered by their applause. She corresponded with Voltaire and invited him to her Court; patronized Diderot, who lived some time in Saint Petersburg; asked D'Alembert to complete the *Encyclopédie* there; made Grimm her literary agent in Paris; translated Marmontel's *Bélisaire* into Russian, and in reorganizing the laws of the Empire took Montesquieu as her model. Her foreign policy, fantastic as to her dream of expelling the Turks from Europe and founding a new Byzantine empire under a prince of her house, bore substantial fruit in securing for Russia the lion's share in the partitions of Poland, in humbling the Turks, annexing the Crimea and Courland, and extending the boundaries of Russia to the Dniester. During the early part of her reign she was called upon to frustrate the plots to place on the throne Ivan, son of Anna Carlovna, and, later, to suppress the formidable revolt, in the Volga region, of the Cossack Pugatcheff, a pseudo-Peter (1771-74) who had enlisted the support of the peasantry and the extreme orthodox party. Toward the end of her reign her extravagance and the corruption of her Court brought her into discredit in Russia, as well as among the sovereigns of Europe. The progress of the French Revolution checked her ardor for reform according to French models, and she finally prohibited the publication of French works in Russia. She died of an attack of apoplexy in November, 1796.

Consult: *Memoirs of the Empress Catharine II.*, translated from the French (New York, 1859); Bury, *Catharine II.* (New York, 1900); Castéra, *Histoire de Catherine II.*, in two English translations, by Tooke (London, 1798), and by Hunter (London, 1800); Dashkoff, *Memoirs of the Princess Daschkaw* (London, 1840); K. Waliszewski, *The Romance of an Empress: Catharine II. of Russia* (London, 1894); Bilbasoff, *Geschichte Katharina II.*, translated from the Russian (Berlin, 1893); Brückner, *Katharine die Zweite*, Oncken series (Berlin, 1883). A good bibliography is contained in Lavisse and Rambaud, *Histoire générale*, Vol. VII. (Paris, 1896).

CATHARINE DE' MEDICI, dâ mā'dê-chē (1519-89). Queen of Henry II. of France. She was the daughter of Lorenzo de' Medici, Duke of Urbino, and was born in Florence in 1519. In 1533 she married Henry, second son of Francis I. of France. The death of her uncle, Pope Clement VII., who had arranged the marriage, left her without a powerful friend, but her submissive conduct won the favor of Francis, and in some measure that of her husband, who became King in 1547. She was the mother of four sons, of whom three became kings of France; and with the accession of the eldest, Francis II., in 1559, the Queen-mother asserted herself in the Government. On the death of Francis II., in 1560, and the accession of Charles IX., the Government fell entirely into her hands. Her political principles were the selfish ones which obtained at the petty courts of Italy in the Fifteenth and Sixteenth centuries. She made a league with the Huguenots to overthrow the Guises (q.v.), and when this attempt failed, and the civil war which ensued ended in the Peace of Amboise, highly favorable to the Protestants, she became alarmed at the increase of their power, and entered into a secret treaty with Spain for the extirpation of heretics. Subsequently she entered into a plot with the Guises, in which at first only the murder of the Protestant leaders was contemplated, but which resulted in the fearful massacre of Saint Bartholomew. (See BARTHOLOMEW'S, MASSACRE OF SAINT.) The Queen-mother boasted of this deed to the Roman Catholic governments, and palliated it to Protestants, for she now managed all the correspondence of the Court. About this time she succeeded, by gold and intrigues, in having her third son, afterwards Henry III., elected to the Polish throne (1573). Her arbitrary administration roused the opposition of a party among the Catholics, headed by her fourth son, the Duke of Alençon, who allied themselves with the Protestants. It was very generally believed that she contributed to Alençon's death. After the accession of Henry III., Catharine continued to be the power behind the throne, the mainspring of all intrigues. The treachery of Catharine and her sons toward all who trusted them alienated all parties, and she died, January 5, 1589, friendless and unmourned, at the Castle of Blois. Her control had done much toward the demoralization of France. (Consult: *Lettres de Catherine de Medicis* (Paris, 1880-91); Balzac, *Sur Cathérine de Medicis* (Paris, 1864); Chéruel, *Marie Stuart et Cathérine de Medicis* (Paris, 1858); Zeller (editor), *Cathérine de Medicis et les Protestants: extraits de Castelnau* (Paris, 1889); Alberi, *Vita de Caterina de' Medici* (Florence, 1838).

CATHARINE HOWARD. See HOWARD, CATHARINE.

CATHARINE OF AR'AGON (1485-1536). Queen of England, the first wife of Henry VIII., and fourth daughter of Ferdinand and Isabella, King and Queen of Aragon and Castile. She was born in December, 1485. She occupies a prominent place in English history, not for what she herself was, but for what she was the occasion of—the Reformation. In pursuance of his foreign policy, Henry VII. negotiated a matrimonial alliance between Catharine and his son Arthur, Prince of Wales. She came to England in 1501, and on November 14, a few days after the public betrothal, the marriage was celebrated. Never a wife, except in name, Catharine was left a widow by the death of Arthur on April 2, 1502. A few months later, a second marriage was projected for her by her father-in-law, with his second son, Henry, as yet only a boy of 12 years. The Pope's dispensation enabling such near relatives to marry was obtained in 1504, and the marriage took place in June, 1509, immediately after Henry's accession to the crown as Henry VIII. Although Henry was very far from being a model husband, he appears to have treated Queen Catharine, who bore him several children, with respect, until, some years after, he conceived a passion for Anne Boleyn (q.v.), by whom he was attracted as early as 1522. He professed doubts as to the validity of his marriage, and in 1526 a collusive suit was secretly brought before Wolsey. Nothing came of this; but in 1527 the question of divorce was openly raised. Pope Clement VII. refused to declare the marriage void at Henry's request through the latter's secretary, Knight, whom the King had sent to Rome for that purpose. He, however, granted a commission to Campeggio and Wolsey, to inquire into the validity of the marriage; but before these prelates Queen Catharine refused to plead, and appealed to the Pope. The King craved judgment. The legates cited the Queen, and declaring her contumacious when she did not appear, went on with the cause; but Cardinal Campeggio, anxious only to stay the proceedings when the King expected a decree, prorogued the court until a future day. The King consulted the universities of Europe, many of which declared the marriage invalid. The Pope now summoned the King to Rome, but Henry haughtily refused to appear either in person or by deputy, for he maintained that such obedience would be to sacrifice the prerogatives of his crown, and, setting the Pope at defiance, he married Anne Boleyn, January 25, 1533. On the 10th of the following May Cranmer declared the first marriage void, and on March 23, 1534, Pope Clement pronounced it valid, thus making the separation of England from Rome complete. Queen Catharine did not quit the kingdom, but was closely guarded at Ampthill, in Bedfordshire, afterwards at Buckden, and then at Kimbolton Castle, Huntingdonshire, until her death on January 7, 1536. In the meantime, although absolutely friendless and harassed by ceaseless persecution, she displayed heroic courage and surprising mental powers, defeating every base design of the King and his agents to induce her to sign away the rights of herself and her daughter Mary. Catharine was educated under her mother's direction, and was a fair Latin scholar. Her character was unimpeachable, and her disposition sweet and gentle. Consult: *The Calendars of State Papers* for the reign, edited by Brewer and Gairdner (1880-90), and the Spanish series, edited by Bergenroth and Gayango, Vol. II. (1868); Brewer and Gairdner, *Letters and Papers of the Reign of Henry VIII.* (London, 1862); Hall, *Chronicle* (London, 1809); Pocock, *History of the Reformation* (new ed., London, 1873); *The Divorce, 1527-33* (2 vols., Oxford, 1870); Le Grand, *History of the Divorce of Henry VIII. and Catharine*, with Burnet's answer (London, 1690); Nicholas Harpsfield, *Treatise on the Pretended Divorce*, ed. by Pocock (London, 1878); Froude, *The Divorce* (New York, 1891); Froude, *History of England*, Vols. I.-II. (New York, 1871); Cavendish, *Life of Cardinal Wolsey*, 2d ed. (London, 1827); Dixon, *Two Queens* (London, 1873-74); Lingard, *History of England*, Vol. VI. (Boston, 1853-55); and Brewer, *Reign of Henry VIII.*, ed. by Gairdner (2 vols., London, 1884). An excellent bibliography of the divorce controversy is provided by Huth, *Marriage of Near Kin*, 2d ed. (London and New York, 1887).

CATHARINE OF BRAGANZA, brȧ-gän′zȧ (1638-1705). Queen of Charles II. of England. She was the daughter of John IV., Duke of Braganza and King of Portugal. Her mother, a woman of ability, who governed Portugal for several years after the death of her husband, foresaw the Restoration in England, and proposed the marriage of Catharine with Charles to gain an ally against Spain. That power tried to prevent the marriage: Portugal gave a dowry of £300,000 and the towns of Tangier and Bombay, besides many privileges of trade. After the marriage at Plymouth, in May, 1662, Charles was pleased with the innocence and sweet disposition of his bride, who had been carefully trained in a convent. But he soon introduced mistresses into the Court, and, when the Queen expressed indignation, lectured her upon the duty of submission. After repeated humiliations of this kind, she passively acquiesced, and Charles, fickle as he was, showed her a certain attention and affection for which she was grateful. He shielded her from the calumny and plots of anti-Romish agitators, who charged her with a design to poison the King and propagate the Catholic faith in England. She truly mourned his death. After a life of seclusion during the reign of James II. and the first years of William III., she returned to Portugal in 1692, and acted as regent to her brother, Dom Pedro, until her sudden death, December 31, 1705. Consult: Strickland, *Lives of the Queens*, Vol. IV. (London, 1888); Jesse, *Memoirs of the Court of England*, Vol. III. (London, 1876); Ranke, *History of England, Principally in the Seventeenth Century* (Oxford, 1875).

CATHARINE OF VALOIS, vȧ′lwä′, or OF FRANCE (1401-38). Queen of Henry V. of England. She was the daughter of Charles VI. (q.v.). When she was 12 years old, Henry proposed to marry her and demanded as a dowry the provinces ceded by the Treaty of Bretigny (q.v.), together with Normandy. The proposition was rejected, but Henry soon afterwards invaded France and forced a compliance with his terms. When he married Catharine at Troyes, June 2, 1420, he received immediate possession of the provinces claimed, the regency of France during the life of his father-in-law, and the reversion of the sovereignty after the death of Charles. On February 23, 1421, Catharine was crowned in London, and on December 6 of that year she became the mother of Henry VI. The next year she was in France, where her husband died, and she returned to London with his body. After the funeral little is heard of her history, the only notable event being her secret marriage to Owen Tudor, the pretended heir of a princely house in Wales. The marriage was kept secret until 1436. By Tudor she had four children, one of whom was made Earl of Richmond, and married Margaret Beaufort, heiress of the House of Somerset, and junior representative of the branch of John of Gaunt. Margaret became the mother of Henry VII.

CATHARINE PARR. See PARR, CATHARINE.

CATHARTIC (Fr. *cathartique*, from Gk. καθαρτικος, *kathartikos*, purgative, from καθαρος, *katharos*, clean). A name originally applied to any medicine that was supposed to purify the system from 'disease material' (*materies morbi*), which was generally presumed by the ancients to exist in all cases of fever and acute disease (see CRISIS), and to require to be separated or thrown off by the different excretions of the body. Ultimately the term 'cathartic' became limited in its signification to remedies capable of causing copious evacuation of the bowels, and having a much more pronounced effect than the 'laxatives.' Purgatives occupy a position midway between laxatives and cathartics in violence of action. The principal cathartics are aloes, colocynth, rhubarb, jalap, senna, Epsom and other salts, castor-oil, croton-oil, and elaterium. They are employed when it is desirable to terminate an attack of constipation, or to cause large, watery evacuations for the purpose of abstracting water from the blood, so that water in the pleural or abdominal cavities or in the cellular tissues may pass into the blood-vessels and thereby reduce a dropsical condition. Cathartics act as irritants on the alimentary canal, provoking increased secretion to expel them, or as stimulants of the peristaltic action of the muscular coat of the intestine through reflex nervous disturbance. See the drugs mentioned, under their names. See also CONSTIPATION.

CATHAR'TIDÆ. See CONDOR.

CATHAY, kăth-ā'. A term which came into use in later mediæval times and was applied to the vaguely wondrous regions of the far East. It was given to China by the first European explorer in that land, Marco Polo (q.v.). It is supposed to have been derived by him from the name of a race of mediæval conquerors of northern China, *Khitah* or *Khitan*, who had almost disappeared at the time of his visit, and who may have been conceived by him as having formed the original substratum of the Chinese people. It is an interesting fact that the name of this conquering tribe, which has long since disappeared in the place of its origin and mediæval use, is preserved in the modern Russian name for China, i.e. Khitai. Columbus reasoned that, since the earth is spherical and not flat, he could reach Cathay by sailing westward.

CATH'CART, Sir GEORGE (1794-1854). A British general, son of William, Earl Cathcart. Educated at Eton and Edinburgh, he joined the army in 1810; fought in the campaigns of 1812-13; served as aide-de-camp to the Duke of Wellington, at Quatre Bras and Waterloo; in 1837 quelled the outbreak in Canada; and in 1852-53, as Governor of the Cape of Good Hope, ended the Kaffir War. He distinguished himself by his bravery in the Crimean War and fell at Inkermann on November 5, 1854. He was buried at Cathcart's Hill, which was named after him. He was the author of *Commentaries on the War in Russia and Germany in 1812 and 1813* (London, 1850).

CATHCART, Sir WILLIAM SCHAW (1755-1843). First Viscount and Earl Cathcart of the United Kingdom (1814); previously, tenth Baron Cathcart of Scotland (1807). A British general and diplomatist, son of Baron Cathcart of Cathcart, Renfrew. He was born September 17, 1755. Educated at Petersham, he studied law at Dresden and Glasgow, was admitted advocate, but at his father's death entered the army, took a prominent part in the American war, and fought with distinction in Flanders and Germany. In 1801 he was made lieutenant-general, and in 1803 commander-in-chief for Ireland. In July, 1807, he commanded the land forces coöperating with the fleet in the British attack on Copenhagen. For his services he was raised to the peerage, with the title of viscount, and received the thanks of Parliament. In 1813 he was ambassador to Saint Petersburg, accompanied the Czar Alexander in the campaigns of 1813 and 1814, and was present at the Congress of Vienna. He was raised to the rank of earl, July 16, 1814. In 1821 he retired from public life, and died June 16, 1843.

CATHCART, WILLIAM (1826—). An American Baptist clergyman. He was born at Londonderry, Ireland, and was educated at the University of Glasgow and at Horton (now Rawdon) College, Yorkshire, England. He came to the United States in 1853, held a pastorate in Philadelphia, and was elected president of the American Baptist Historical Society. His publications include the following: *The Baptists and the American Revolution; The Papal System; The Baptist Encyclopædia*, his most important work; and *The Baptism of the Ages and of the Nations*.

CATHEDRAL (from Gk. καθέδρα, *kathedra*, a seat). This word was used of the actual throne of the bishop in the apse of his church. Hence the episcopal church was called a cathedral church—*ecclesia cathedralis*; the residence of the bishop was a cathedral city, and a formal decision of the bishop was an *ex-cathedra* utterance. There could be but a single such church or city in the bishop's province. This was called originally a *parish*, but soon a *diocese*, corresponding exactly to the late Roman civil diocese or province. All churches within his diocese were consecrated by the bishop, and all except his one episcopal church were called parish churches. With certain exceptions, even the monastic churches came under the jurisdiction of the bishop. The term used for the capital church of the diocese was in early times *ecclesia mater*, or *matrix*, and the term *ecclesia cathedralis* came later, and cathedral was first used as a substantive only in the Tenth Century and then only in the West, for in the East neither the name nor the power it represented ever existed. How the special body of cathedral clergy was formed by a gradual process from the diocesan clergy is a matter foreign to this article. But the prominence of cathedral churches at different times corresponds largely to the religious and political power of the episcopacy. Thus, cathedral churches were important in the Fourth and Fifth centuries, when such men as Augustine, Ambrose, Cyril, and John Chrysostom were bishops and ruled the Christian world. But when monasticism, under the followers of Benedict and Basil, was overwhelmingly ascendent, as it was from the Seventh to the Eleventh Century in both East and West, monks occupied the cathedral thrones and filled the ranks of the canons, episcopal churches could not vie with those of the great monasteries, and the people, the Government, and the Papacy looked to abbots and not to bishops. Then arose that hybrid class of monastic cathedrals, especially in countries converted by monks, such as England and Germany in Saxon and Carlovingian times. It was when the great communal movement came in the Eleventh and Twelfth centuries that three new social powers arose—centralized government, communal autonomy, episcopal independence. In the social struggle the kings and emperors usually sided with the free communes and their bishops—especially in France and Germany. The cathedral churches became for the cities the badge of civic autonomy, the centre of civil as well as of religious life, the outward sign of prosperity. The Rhenish cities—Cologne, Speyer, Worms, Mainz—were among the first; then the Hanseatic towns and the Saxon, Lübeck, Hanover, Hildesheim, all in the Tenth and Eleventh centuries. They felt that great movement under the Othos and Henrys. Next came, in the Eleventh and Twelfth centuries, the great Italian communes—Pisa, Milan, Parma, Cremona, Bologna, and others in the north; with even southern cities, such as Benevento, Bari, Trani, Amalfi. Then the communal movement reached France in the middle of the Twelfth Century, and it bloomed with the rise of Gothic at Sens, Senlis, Noyon, Laon, Paris. In the Thirteenth Century, the episcopal power and the importance of the cathedral reach their zenith and the important monuments then built throughout Europe are too numerous to enumerate (some of them are given in the paragraph on *Gothic Architecture*, under ARCHITECTURE). It is then that the small Eastern monuments, even when in fair preservation, give way to new and more sumptuous ones, under the religious enthusiasm born of the Crusades, which led the entire people to give their work freely. A cathedral was usually erected by means of voluntary contributions solicited from all classes—rich and poor—not only throughout the diocese, but beyond. Previously the trend of munificence had been almost entirely directed toward the monastic orders. (See BENEDICTINES; MONASTERY.) But enthusiasm was now much more universal for the erection of the cathedrals that were truly representative of the whole people. Contemporary chronicles are full of the way the people of both sexes and all ages brought and handled the stone, the timber, and other materials. When completed the cathedral served also as town hall for political meetings, as hall for the performances of the *mysteries* which were the theatrical performances of the Middle Ages, its square for the periodical fairs. It usually crowned the city, rising far above its roofs in a central and prominent position. Among the most important cathedrals, architecturally speaking, are the following:

ITALY. Pisa, Lucca, Florence, Siena, Orvieto, Milan, Bologna, Ferrara, Modena, Piacenza, Bari, Como.

GERMANY. Cologne, Strassburg, Freiburg, Mainz, Speyer, Worms, Bonn, Ulm, Ratisbon.

AUSTRIA-HUNGARY. Vienna.

FRANCE. Paris, Laon, Noyon, Poitiers, Le Puy, Amiens, Chartres, Bourges, Rouen, Rheims, Troyes, Orleans, Lyons, Beauvais.

ENGLAND. Ely, Lincoln, Salisbury, Peterborough, Durham, Wells, York, Canterbury, Lichfield, Saint Paul's.

SPAIN. Toledo, Burgos, Barcelona, Leon, Salamanca, Seville, Tarragona.

BELGIUM. Tournai, Brussels, Antwerp.

It cannot be said that there was any special style or special form of plan used for cathedrals as distinct from other churches. The large body of canons connected with a cathedral made a large choir natural, and so the development of this part of the church (see CHURCH) in the monastic churches of the preceding age was adopted by the cathedral builders of the Twelfth and succeeding centuries. The greater size and immense resources available made, however, the cathedrals the touchstones of artistic conditions. Also in France, where scholastic philosophy was seeking to synthetize life and knowledge, the cathedral was made the vehicle for the expression in material forms of its encyclopædic learning for the edification of the masses. The Church had always sought to make of art a great educational engine, and the effort, previously scattered in basilicas and churches of all kinds, was now more concentrated in the cathedrals.

In Italy the cathedral, the tower, and the baptistery usually formed a group of three in the great square, and to them was often added the episcopal palace. Sometimes, especially in France and England, semi-monastic buildings with cloister, chapter-house, and refectory, were attached to the cathedral, but usually it stood clear, on the most conspicuous site of the city. Rome occupied a unique position. Saint John Lateran was more than the cathedral of Rome: it was the mother of all churches, being the seat of the Pope, but it was not called cathedral. Saint Peter succeeded it in the Fifteenth Century. The other great basilicas of Rome—Saint Paul Without the Walls, Santa Maria Maggiore, Santa Croce in Gerusalemme—also had a rank superior to that of the ordinary cathedral. The bishop in his church was surrounded by his college of presbyters, of which he was the head, and the design of which was: (1) To strengthen him by wise counsel; (2) to maintain public worship with reverence and dignity (3) to go forth at his command, as evangelists, whithersoever he might send them. It sometimes consisted of 'secular clergy,' who were not bound by monastic vows, and had separate homes of their own; and sometimes of 'regulars,' who were under monastic rule and lived in buildings common to all. Of both kinds of chapters the bishop was the head; of the latter, as the abbot of the monastery to which his cathedral church belonged; and of the former, as having sole authority over it. In early times there was an arch-presbyter, who had chief authority among the cathedral clergy, always in strict subordination to the bishop. He was gradually supplanted by the archdeacon, who was followed in the Eighth and Ninth centuries by the 'præpositus' or provost. The 'dean,' the present head of all English cathedral chapters, first appears in the Tenth or Eleventh Century. Often, if the bishop's diocesan duties increased and important political functions also were assigned him, he was obliged to leave the affairs of his cathedral to the head of the chapter. This is the explanation of the strange anomaly, sometimes witnessed in modern times, that in his own cathedral church the bishop has less authority than in any other church of his diocese. Under the bishop as its nominal head, the chapter of a fully organized cathedral, formed of secular priests, consisted of four chief dignitaries and a body of canons. I. The four high officers were: (1) the 'dean,' as the general head of the chapter charged with its internal discipline; (2) the precentor, presiding over the choir and musical arrangements; (3) the chancellor, who superintended the religious and literary instruction of the younger members, took care of the library, and wrote the letters; (4) the treasurer, to whom were intrusted, not the money of the church (as might appear from the modern use of the word), but its sacred vessels, altar furniture, reliquaries, and similar treasures. II. In addition to these dignitaries, a cathedral chapter consisted of a board of officers called canons; some of them who enjoyed a separate estate (præbenda) in addition to their share of the corporate funds, were called prebendaries. In the Middle Ages an attempt was made to impose on them, in part, monastic rules with dining-hall and lodging-rooms in common; but the restriction was never acceptable, and was gradually given up. Monastic cathedrals closely resembled other monasteries, except that in the almost constant absence of the bishop—their nominal abbot—they were governed by a prior. At the Reformation the distinction between secular and monastic cathedrals was maintained under the titles of cathedrals of the old and new foundations.

At present, all dioceses of the Roman Catholic Church in the United States, and many dioceses of the Protestant Episcopal Church, have cathedrals. The finest specimen of cathedral architecture at present existing in this country is Saint Patrick's Roman Catholic Cathedral, in New York City, begun in 1858 and practically completed in 1889, at a cost of some $2,500,000. It will, however, be surpassed in size and in magnificence by the new Protestant Episcopal Cathedral of Saint John the Divine, now in process of erection on Cathedral Heights, New York City.

CATHEDRAL, The. A poem by James Russell Lowell, published in Boston in 1869. It is a description of a day spent before the famous cathedral in Chartres, France.

CATHELINEAU, kä't'-lē'nō', Jacques (1759-93). A leader of the insurgents in La Vendée during the French Revolution. He was born in very humble life, at Pin-en-Mauges, in the Department of Maine-et-Loire. For two years before the Vendean insurrection broke out at Saint-Florent, Cathelineau was busy organizing the peasants and providing them with weapons. When the open conflict came, he led a body of 3000 men, and in company with Bonchamp and Elbees captured several towns. After the victory of Saumur (q.v.), the council of generals appointed him, as having the greatest influence over his countrymen, commander-in-chief. He immediately determined to make an attack upon Nantes, and managed to penetrate into the town, where he was wounded by a musket-ball, whereupon his troops dispersed. He was carried to Saint-Florent, where he died July 11, 1793. He was a man of great simplicity and honesty of character, and for his piety was called the Saint of Anjou. Consult La Porte, *La légende de Cathelineau* (Paris, 1893).

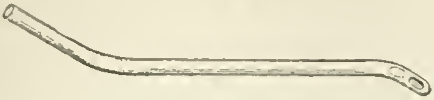
CATH'ERINE. See Catharine.

CATHERINE. A novel by William Makepeace Thackeray, published in *Fraser's Magazine* in 1839-40, under the *nom-de-plume* of Ikey Solomons. The work was designed to counteract the injurious influence of some of the popular sensational fiction of the day, which took heroes from the criminal classes. The heroine of the tale had a prototype in one Catherine Hayes, who was burned at Tyburn, in 1726, for the deliberate murder of her husband under the most revolting circumstances.

CATHERINE-WHEEL (from the image of Saint Catharine represented as being martyred on the wheel). An heraldic device which is frequently used as a charge in coats of arms, when it is represented with teeth.

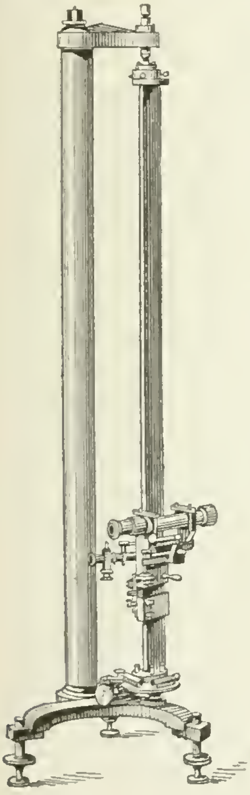
CATH'ERWOOD, Mary Hartwell (1847-1902). An American novelist, born at Luray, Ohio. After graduating from the Female College at Granville, Ohio, (1868), she settled at Newburg-on-the-Hudson, where she began writing stories for the magazines. To this period belong several good novels, among which may be cited *Cracque o' Doom* (1881). Soon after her marriage to James S. Catherwood, of Hoopeston, Ill., she began a series of very successful historical romances illustrating French Canada. They comprise mainly *The Romance of Dollard* (1889); *The Story of Tonty*, into which is introduced La Salle (1890); *The Lady of Fort Saint John* (1891); *The Chase of Saint Castin, and Other Stories of the French in the New World* (1894); and *Macinac and Lake Stories*, dealing with the mixed settlements in the islands of the Great Lakes (1899). In a similar manner, Mrs. Catherwood wrote of Illinois and the neighboring States in *Old Kaskaskia* (1893); *The Spirit of an Illinois Town*, a delightful story of two generations ago (1897); *Little Renault* (1897); *Spanish Peggy* (1899); *The Queen of the Swamp, and Other Plain Americans*, a collection of short stories of life in the Middle West a century ago (1899); and *Lazarre* (1901). She also made a careful and appreciative study of the Maid of Orleans in *The Days of Jeanne D'Arc* (1897). Mrs. Catherwood's interest in French North America naturally led her from fiction to history. Her *Heroes of the Middle West* (1898) is an account of the French occupation from 1673 to 1763.

CATH'ETER (Lat., from Gk. καθετήρ, *kathetēr*, from καθετός, *kathetos*, lowered, perpendicular, from κατά, *kata*, down + ἱέναι, *hienai*, to send). A surgical instrument in the form of a tube, used for insertion into a mucous canal. The term is generally applied to a tube used to pass through the urethra into the bladder, for the purpose of drawing the urine; but there is also a catheter which is passed through the Eustachian tube from the naso-pharynx into the middle ear, and a catheter which is passed from the bladder through the ureter into the pelvis of the kidney, etc. Urinary catheters are made of silver, glass, or rubber. Woven linen, impregnated with gum elastic, is also used as a material for making catheters, and such an instrument is generally used with a stiff wire, called a stylet, in its lumen, the stylet being withdrawn after the instrument is in place. The catheter in ordinary use is made of silver or soft rubber, the latter being less liable to do injury or to give pain in the male patient. For the male, the length of a catheter should be about ten inches with a curve of two inches at the extremity, if of metal. For the female, the catheter should measure about five inches, with a slight curve of half an inch at the extremity, if of metal.



CATHETER.

CATH'ETOM'ETER (Gk. κάθετος, *kathetos*, vertical + μέτρον, *metron*, measure). A physical instrument employed in the exact measurement of vertical distances, such as the height of a column of liquid in a glass tube or the elongation of a wire. The cathetometer is employed extensively in the exact reading of a standard barometer and other measuring apparatus. It is constructed in numerous forms, but in general it consists of a vertical staff of metal so mounted on a base with foot-screws that it can be leveled and made to assume a truly vertical position. On this rod slides a carriage on which is mounted a small telescope with cross-hairs accurately adjusted in its axis. This telescope can be so arranged that it can move through any horizontal plane which is perpendicular to the axis of the upright supporting rod. The telescope is directed at an object or point whose vertical distance from another object or point it is desired to obtain. The adjustment is usually made by micrometer-screws, and the carriage with its telescope raised and lowered until the point is bisected by cross-hairs. The distance may be read off either on the rod itself by means of suitable microscopes and verniers or on an auxiliary scale on which the telescope or auxiliary microscope may be focused and whose graduations and coefficients of expansion are accurately known. The adjustments of the cathetometer are somewhat similar to those of an engineer's level, and the different instruments vary with different makers and investigators. A typical instrument is shown in the illustration.



CATHETOMETER.

CATH'ODE RAYS. See ELECTRICITY. These rays are described in that portion of the article which discusses discharge through gases.

CATHOLIC APOSTOLIC CHURCH. The proper designation of a body of Christians who object to any designation which implies sectarianism, and therefore to their common designation Irvingites, which is given to them from their connection with Rev. Edward Irving (q.v.). In the winter of 1829-30, Irving, then a minister of the Scotch Church, Regent Square, London, delivered a series of lectures on spiritual gifts, in which he maintained that those which we are in the habit of calling 'extraordinary' or 'miraculous' were not meant to be confined to the primitive Church, but to be continued through the whole period of the present dispensation. About the same time, as if to confirm the views of the great preacher, there occurred at Port Glasgow, in the west of Scotland, certain strange phenomena. It was alleged that miraculous acts of healing had happened, and that the gift of tongues had reappeared. After what seemed to be a sufficient investigation on the part of some of the members of Irving's church, it was concluded that the manifestations were genuine. Similar manifestations shortly after occurred in his own church, which were also pronounced to be genuine. They were held to be of two kinds: first, speaking in tongues, and second, prophesying. As the former bore no resemblance to any language with which men were conversant, it was believed to be strictly an 'unknown tongue,' the Holy Ghost "using the tongue of man in a manner which neither his own intellect could dictate, nor that of any other man comprehend." The latter, 'prophesying,' consisted chiefly of "exhortations to holiness, interpretations of Scripture, openings of prophecy, and explanations of symbols." After some time, Irving was deposed from his office for heresy by the Church of Scotland, but meanwhile the religious opinions with which his name is associated had been assuming a more definite and ecclesiastical shape. The final result was the *Catholic Apostolic Church*, the constitution of which is briefly as follows:

There are, as in the apostolic times, *four* ministries: first, that of 'apostle'; second, that of 'prophet'; third, that of 'evangelist'; and fourth, that of 'pastor.' The apostles are invested with spiritual prerogatives; they alone can minister the Holy Ghost by the laying on of hands; to them the mysteries of God are revealed and unfolded to the Church; and they decide on matters of order and discipline. Nothing that transpires in any church in the way of 'prophetic utterance' can be authoritatively explained save by them; and the various 'angels of the churches' are bound to bring all such utterances under their cognizance, in order that they may be rightly interpreted. The function of the 'prophet' has been already indicated. The work of an 'evangelist' mainly consists in endeavoring to bring in those who are without. The 'angel' of the Catholic Apostolic Church corresponds with the bishop of other Christian denominations. The ministers of each full congregation comprise an angel, with a fourfold ministry (consisting of elders, prophets, evangelists, and pastors), and a ministry of deacons to take charge of temporal matters. This ministry is supported by tithes, the people giving a tenth of their income for the support of the priesthood. Church affairs are managed by a council of ministers of all classes, whose selection and arrangement are conceived to have been foreshadowed in the structure of the Mosaic tabernacle.

The Catholic Apostolic Church does not differ from other Christian bodies in regard to the common doctrines of the Christian religion; it only accepts, in what it considers to be a fuller and more real sense, the *phenomena* of Christian life. It believes that the wonder, mystery, and miracle of the Apostolic times were not accidental, but are essential to the divinely instituted Church of God, and its main function is to prepare a people for the second advent of Christ. A very special feature of the Catholic Apostolic Church is its extensive and elaborate symbolism. In regard to the sacrament of the Lord's Supper, the doctrine of the objective presence is held, but both transubstantiation and consubstantiation are repudiated.

The Catholic Apostolic Church has established itself in England, Scotland, Canada, the United States, Prussia, France, Switzerland, Ireland, Belgium, Russia, Denmark, Sweden, Australia, and India. In the United States it has ten churches and about thirty ministers. Consult G. Miller, *History and Doctrines of Irvingism* (London, 1878).

CATHOLIC BENEVOLENT LEGION. A fraternal organization in the United States which has for its object to unite for social and benevolent purposes Roman Catholic men between the ages of 18 and 55. It was organized in 1881, and since that time has distributed over $14,000,000 to the beneficiaries of deceased members. It has 516 councils, in all parts of the United States. There is also an organization for women on parallel lines, known as the Catholic Women's Benevolent Legion.

CATHOLIC CHURCH (Lat. *catholicus*, Gk. *καθολικός*, *katholikos*, general, universal, from *κατά*, *kata*, according to + *ὅλος*, *holos*, whole). The phrase Catholic Church is equivalent to 'universal Church,' and cannot properly be applied to any particular sect or body, though the various Christian denominations hold themselves to be within the meaning of the appellation as portions more or less pure of the Church Universal. It was first employed to distinguish the Christian Church from the Jewish; the latter being restricted to a single nation, whereas the former was intended for the world in general. Afterwards, it served to mark the difference between the orthodox Christian Church and the various sects which sprang from it. The name has been retained by the Church of Rome, which was the visible successor of the primitive one; and although Protestant divines have been careful to deny its applicability to this Church any more than to others professing Christianity, yet the term 'Catholic' is still used by the populace of almost every Protestant country as synonymous with Roman Catholic, so that from their minds all conception of the literal meaning seems to have vanished. For an account of the Church of Rome, see the article ROMAN CATHOLIC CHURCH.

CATHOLIC (UNITED) COPTS. A body of about 5000 native Egyptian Christians, who acknowledge the authority of the Pope of Rome. In 1855 one of their priests was appointed vicar apostolic and bishop *in partibus* residing in Cairo, but in 1895 Pope Leo XIII. gave the body a regular hierarchy, whose head is styled 'Patriarch of Alexandria of the Copts.' Consult E. L. Butcher, *The Story of the Churches of Egypt from the Roman Conquest till Now* (London, 1897).

CATHOLIC CREDITOR. In the law of Scotland, one whose debt is secured by a lien or charge on more than one item of property belonging to the debtor—e.g. on two or more heritable estates for the same debt. The catholic creditor is bound so to exercise his right as not unnecessarily to injure the securities of other creditors. Thus, if he draw his whole debt from one piece of property, he must assign his security over the rest to the postponed creditors. The right of such a creditor is called a *catholic right*. Consult Erskine, *Principles of the Laws of Scotland* (Edinburgh, 1881). For the corresponding principle of the English and American law, see MARSHALING.

CATHOLIC EMANCIPATION ACT. See ROMAN CATHOLIC EMANCIPATION ACT.

CATHOLIC EPISTLES. A group of seven letters in the New Testament (James, I., II. Peter, Jude, I., II., III. John) which have been designated by this name, as denoting the comprehensive circle of the readers addressed in distinction from the individual churches and persons addressed in the letters by Paul. The term was first used in the Eastern Church, about the Second Century, and then only with reference to I. John, which was so named in contrast with II. and III. John, as private letters. Later it was applied to II. Peter and Jude, as relatively general in their addresses; then to James and I. Peter, as addressed to large portions of the Church; and finally II. and III. John were included, either on the supposition that the names given in their addresses (II. John "the elect lady and her children," III. John "Gaius, the beloved") were figurative designations of the Church, or under the impulse to gather all of John's letters in the same group. The term was also used of writings outside the canon (e.g. by Origen of the Epistle of Barnabas) and even of heretical writings (e.g. by Apollonius [in Eusebius, H. E. vii. 25] of the Epistle of the Montanist Themiston). Cyril of Alexandria applies it to the letter of the Church of Jerusalem, given in Acts xv. By the Fourth Century it had come to designate in the East the present group of seven letters. In the West these writings were not known by any group name until the Fifth or Sixth Century, and then the name which was given them was *Canonical.*

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CATHOLIC KNIGHTS OF AMERICA. A Roman Catholic fraternal order founded in 1877 at the suggestion of Archbishop Feehan, then Bishop of Nashville, for the purpose of providing Roman Catholic men with the same advantages as were offered to others in the fraternal organizations outside their Church. It is the pioneer of the Roman Catholic assessment insurance organizations, and the only one which admits women to membership on the same footing as men. There are now some 600 branches in the order, with a total membership of about 25,000; it also has a uniform rank, with a membership of 2000. Up to 1902 it has paid about $11,500,000 to the beneficiaries of its deceased members, and it was the first organization to adopt the plan of a reserve fund to insure the meeting of its obligations. Its membership is limited to Catholics in good standing.

CATHOLIC MAJESTY, His Most. One of the formal designations of the King of Spain. It was given to Ferdinand V. of Aragon and Castile by Pope Alexander VI., and retained by later kings.

CATHOL'ICON AN'GLICON (Neo-Lat., from Gk. καθολικός, *katholikos*, universal + Ἀγγλικός, *Anglikos*, relating to England, from Lat. *Angli*, English). The title of an old Latin-English word-book or dictionary, edited by S. J. H. Herrtage for the early English Text Society, and published, with an introduction by H. B. Wheatley, in London, 1881. The original text dates from 1483, and is supposed by the editor to have originated in the East Riding of Yorkshire.

CATHOL'ICOS (Neo-Lat., from Gk. καθολικός, *katholikos*, universal). The title of the head ecclesiastic in the hierarchy of the Armenian, Nestorian, Abyssinian, and Jacobite churches, and of the Christians of Georgia and Ethiopia.

CATHOLICS, Roman. See Roman Catholic Church.

CATHOLIC SUMMER SCHOOL OF AMERICA. A school at Cliff Haven, N. Y., on Lake Champlain. The school was established in 1892, and was modeled largely upon the plan of the Chautauqua Summer School. (See Chautauqua.) The school is designed to afford recreation and to give the Catholic point of view upon issues of the day in history, literature, philosophy, political science, and religion. In a measure the school is an outgrowth of the Catholic Educational Union, formed in 1889. The school is well endowed and largely attended. The official organ is *Mosher's Magazine*, published at Youngstown, Ohio.

CATHOLIC TOTAL ABSTINENCE UNION OF AMERICA. A confederation of all the total abstinence organizations under Roman Catholic auspices, whether men's, women's, or juvenile. It was organized in 1872 on a strictly religious basis, requiring its members to go to Holy Communion at least once a year, and recommending them to go four times. It was approved by Pope Leo XIII. in 1887, and still earlier by the Third Plenary Council of Baltimore, which warned Catholics engaged in the sale of intoxicating drinks to consider seriously by how many and how great dangers, by how many and how great occasions of sin their business—though in itself not unlawful—is surrounded. Urging them, if possible, to choose a more becoming way of making a living, it insisted that they should, at any rate, observe strictly certain regulations of decency and morality, and admonished them solemnly that "if through their culpable neglect or coöperation, religion is brought into contempt or men brought to ruin, there is an Avenger in Heaven who will surely exact from them the severest penalties." Unlike many other societies, this Union does not assert that the use of intoxicants is wrong in itself, but maintains that for many it is a proximate occasion of sin, and must by them be abandoned altogether: and without insisting upon total abstinence as necessary for every one, regards it as one of the strongest weapons against the widespread evil of intemperance, and urges it upon those who wish to suppress this evil. At the present time the Union numbers over 80,000 members.

CATHOLIC UNIVERSITY OF AMERICA. An institution of higher learning at Washington, D. C., conducted under the auspices of the Roman Catholic Church in the United States. The university was incorporated and received its Apostolic Constitution from Pope Leo XIII. in 1887, and was opened for instruction in 1889. It is governed by a self-perpetuating board of trustees, chosen from the episcopate, clergy, and laity. The chief executive officers are the chancellor, the rector, and the treasurer. The courses of study are intended primarily to give professional training and to offer facilities for original research to graduates of Catholic seminaries and colleges. The faculties at present organized are those of theology, philosophy, law, and technology, comprising altogether 29 professors and instructors. The courses offered in 1900 were attended by 180 students. The university has 15 endowed chairs, 2 endowed fellowships, 17 endowed scholarships, and general endowments, amounting altogether to about $860,000. It has expended on permanent properties $1,013,000. Its library contains approximately 32,000 volumes, exclusive of pamphlets. Affiliated to the university, though retaining separate organizations, are the colleges of Saint Thomas Aquinas, the Marist College, the Holy Cross College, and the College of the Holy Land. Saint Paul Seminary, Saint Paul, Minn., is also affiliated under the clause of the university's constitution providing for the affiliation of Catholic seminaries and colleges in the United States. Cardinal Gibbons has been chancellor of the university since its foundation. The Right Rev. John J. Keane was rector till 1896; the Right Rev. Monsignor Thomas J. Conaty till 1902. He was succeeded by Monsignor Dennis J. O'Connell, A.M., D.D. Consult: *Catholic University of America Year Book* (Washington, 1893, et seq.); *Catholic University Bulletin* (Washington, 1895, et seq.).

CATHOLIC YOUNG MEN'S NATIONAL UNION. A federation of the diocesan unions of young men among Roman Catholics in the United States. It was organized at Newark, N. J., in 1875, and Mgr. George Doane, rector of the Pro-Cathedral in that city, was elected its first president. It was formally approved by the Third Plenary Council of Baltimore in 1878, and has now about 50,000 members, distributed in more than 300 societies. Among its presidents have been such distinguished ecclesiastics as Archbishop Kain, of Saint Louis, and Mgr. Loughlin, of Philadelphia. It has shown its practical usefulness not only by consolidating and framing constitutions for diocesan unions and by the stimulating power of its annual conventions, but by the establishment of libraries and reading-rooms and the provision of good reading matter for soldiers and sailors.

CATH′OS. One of the female pedants who are duped by the disguised valets of their disappointed suitors, in Molière's *Les précieuses ridicules.* She assumes the romantic name of Aminte.

CAT′ILINE (Lucius Sergius Catilina) (c.108-62 B.C.). A Roman noble celebrated as the leader of a conspiracy against the Republic. During his youth he attached himself to the party of Sulla. His bodily constitution, which was capable of enduring any amount of labor, fatigue, and hardship, allied to a mind which could stoop to every baseness and feared no crime, fitted him to take the lead in the conspiracy which has made his name infamous to all ages. In the year B.C. 68 he was elected pretor; in B.C. 67, Governor of Africa; and in B.C. 66 he was a candidate for the consulship, but was disqualified on account of the accusations brought against him of maladministration in his province. Disappointed thus in his ambition, and burdened with many and heavy debts, he saw no hope for himself but in the chances of a political revolution, and therefore entered into a conspiracy, including many other young Roman nobles, in morals and circumstances greatly like himself. The plot, however, was revealed to Cicero, then consul, by Fulvia, mistress of one of the conspirators. Operations were to commence with the assassination of Cicero in the Campus Martius, but the latter was kept aware of every step of the conspiracy, and contrived to frustrate the whole design. In the night of November 6, B.C. 63, Catiline assembled his confederates, and explained to them a new plan for assassinating Cicero: for bringing up the Tuscan Army (which he had seduced from its allegiance), under Manlius, from the encampment at Fæsulæ (Fiesole); for setting fire to Rome, and putting to death the hostile senators and citizens. In the course of a few hours everything was made known to Cicero. Accordingly, when the chosen assassins came to the house of the consul, on pretense of a visit, they were immediately repulsed. On November 8 Catiline audaciously appeared in the Senate, when Cicero—who had received intelligence that the insurrection had already broken out in Etruria—commenced the celebrated invective beginning: *Quousque tandem abutere, Catilina, patientia nostra?* ("How long now, Catiline, will you abuse our patience?") The accused was abashed, not by the keenness of Cicero's attack, but by the minute knowledge he displayed of the conspiracy. His attempt at a reply was miserable, and was drowned in cries of execration. With curses on his lips, he abruptly left the Senate, and escaped from Rome during the night. Catiline and Manlius were now denounced as traitors, and an army under the consul, Antonius, was sent against them. The conspirators who remained in Rome, the chief of whom was Lentulus, were arrested, tried, condemned, and executed, December 5. The insurrections in several parts of Italy were meanwhile suppressed; many who had resorted to Catiline's camp in Etruria deserted when they heard what had taken place in Rome, and his intention to proceed into Gaul was frustrated. In the beginning of January, 62, he returned by Pistoria (now Pistoja) into Etruria, where he encountered the forces under Antonius, and, after a desperate battle, in which he displayed almost superhuman courage and enthusiasm, was defeated and slain. The appearance of Catiline was in harmony with his character. He had a daring and reckless look: his face was haggard with a sense of crime; his eyes were wild and bloodshot, and his step unsteady, from nightly debauchery. The history of the conspiracy of Catiline is given by Sallust in a remarkably concise and interesting style, though the speeches contained in it are probably of the author's own composition, and by Cicero himself in the four *Orations Against Catiline.* Consult: the articles "Cæsar," and "Cicero," in Plutarch, *Lives;* and Mommsen, *Römische Geschichte* (6th ed., Berlin, 1874-75), translated by Dickson.

CATILINE, HIS CONSPIRACY. A tragedy by Ben Jonson, played in 1611 and published in quarto the same year. A folio edition appeared in 1616 and a second quarto in 1635. It held the stage only to the close of the century and is a ponderous adaptation of the treasonous practices of Catiline (q.v.).

CATILINE'S CONSPIRACIES. (1) A play by Stephen Gosson (q.v.), written and probably played in London about 1579. Later, in his *School of Abuse,* the author described the purpose of his drama as "to show the reward of traitors in Catiline, and the necessary government of learned men in Cicero." The piece has not come down to us, however; nor is there any record of its having ever been printed. (2) A play by Robert Wilson and Henry Chettle. It is not extant, but a reference to it in Lodge's *Defense of Poetry,* published in 1580, would put its appearance before that date. There is a record of another *Catiline* by these authors which was in process of composition in 1598 and which was probably a revision of the older version.

CATINAT, kȧ′tē′nȧ′, Nicolas de (1637-1712). A French soldier, born in Paris. He distinguished himself at the sieges of Lille (1667) and of Maestricht (1673), and was promoted to be a lieutenant-general. In 1686, contrary to his wishes, he was sent by Louis XIV. against the Waldenses of southern France. The Duke of Savoy, whose secret alliances with Spain and Austria had transpired, he defeated at Staffarda in 1690. He was promoted to be a marshal of France, and concluded the peace of Turin, but in 1701, as commander in Italy during the War of the Spanish Succession, was worsted by Prince Eugene at Carpi. For this he was deprived of his command. Consult Créqui, *Mémoires pour servir à la vie de Nicolas de Catinat* (Paris, 1775).

CATIN′GA (South American word). The forests of the very dry lands of the interior of Brazil are called 'catinga forests.' They contain an unusual collection of trees with barrel-shaped trunks, as the cotton-tree and many thorny trees. See Forests.

CATKIN. See Ament.

CAT'LETTSBURG. A city and county-seat of Boyd County, Ky., at the confluence of the Ohio and Big Sandy rivers, the latter forming the boundary between Kentucky and West Virginia (Map: Kentucky, J 2). The town is on the Chesapeake and Ohio Railroad. It has a considerable trade in lumber and contains wholesale groceries and sawmills, flour-mills, machine-shops, etc. Population, in 1890, 1374; in 1900, 3061.

CAT'LIN, GEORGE (1796-1872). A traveler and writer and painter of Indian portraits, born in Wilkesbarre, Pa. He studied law, but having a taste for art, became a portrait-painter. Having conceived the idea of executing a gallery of Indian paintings in order to rescue from oblivion the various types and customs of the aborigines, he began in 1832 a series of travels extending over eight years among the wildest tribes of North and South America, resulting in a collection of some hundreds of Indian pictures painted by himself, together with several books descriptive of Indian scenes and customs. Most of the paintings, after having been exhibited by the artist in the United States and Europe, finally came into possession of the Government and now constitute the famous 'Catlin Gallery' of the National Museum.

CATLINITE (after Catlin, the American traveler and artist). A hardened clay of reddish color found in Pipestone County, Minn., which was used by the Dakota Indians for the manufacture of pipes.

CATNIP (probably a corruption of *catmint*, cat's mint, by popular confusion with *nip*, Ger. *kneifen*, Lith. *knĕbti*, to pinch; hardly connected with Lat. *nepeta*, catnip), or CATMINT (*Nepeta cataria*). A plant of the order Labiatæ, remarkable for the fondness which cats display for it. It is common in England, in chalky and gravelly soils, but less abundant in Scotland and Ireland, and is widely diffused throughout Europe and the middle latitudes of Asia and of North America. It affects cats in much the same manner as does valerian root, and when its leaves are bruised so as to be highly odoriferous, they are at once attracted to it, rub themselves on it, tear at it, and chew it. Its odor has been described as intermediate between that of mint and that of pennyroyal. It has erect stems, two to three feet high, dense whorls of many whitish flowers, tinged and spotted with rose-color or purple, and stalked, heart-shaped leaves of a velvety softness, whitish and downy beneath. Other species are numerous in the south of Europe and middle latitudes of Asia. For illustration, see DICOTYLEDONS.

CA'TO, DIONYSIUS. The name prefixed to a little volume of moral precepts in verse, which was a great favorite during the Middle Ages. It is very doubtful if such a person as 'Dionysius Cato' ever lived. The date of the original composition seems to be about the Third Century B.C. The title which the book itself commonly bears is *Dionysii Catonis Disticha de Moribus ad Filium*. It begins with a preface addressed by the supposed author to his son, after which come fifty-six injunctions of rather a simple character, such as *parentem ama*. This is followed by the substance and main portion of the book—viz. 144 moral precepts, each of which is expressed in two dactylic hexameters. During the Middle Ages the *Disticha* was used as a text-book for young scholars. In the Fifteenth Century more than thirty editions were printed. An early English translation was published by Caxton. For a modern edition, consult Hauthal (Berlin, 1869).

CATO, MARCUS PORCIUS (B.C. 234-149). A Roman statesman, surnamed *Censorius* and *Sapiens* (the wise), afterwards known as CATO PRISCUS, or CATO MAJOR (Cato the Elder), to distinguish him from Cato of Utica. He was born at Tusculum, in B.C. 234. He inherited from his plebeian father a small farm in the country of the Sabines, where he busied himself in agricultural operations, and learned to love the simple and severe manners of his Roman forefathers, which still lingered round his rural home. Induced by Lucius Valerius Flaccus to remove to Rome, when that city was in a transition epoch from the old-fashioned strictness and severe frugality of Roman habits to the luxury and licentiousness of Grecian manners, Cato protested against this, denounced the degeneracy of the Philo-Hellenic Party, and set a pattern of sterner and purer character. He soon distinguished himself as a pleader at the bar of justice, and, after passing through minor offices, was elected consul (B.C. 195). In his province of Hither Spain, where an insurrection had broken out after the departure of the elder Scipio (B.C. 206), Cato was so successful in restoring order and displayed such military genius that in the following year he was honored by a triumph.

In B.C. 187 a fine opportunity occurred for the display of 'antique Roman' notions. M. Fulvius Nobilior had just returned from Ætolia victorious, and sought the honor of a triumph. Cato objected. Fulvius was indulgent to his soldiers and a man of literary taste, and Cato charges him, among other enormities, with "keeping poets in his camp." These rude prejudices of Cato were not acceptable to the Senate, and his opposition was fruitless. In B.C. 184 Cato was elected censor, and discharged so rigorously the duties of his office that the epithet *Censorius*, formerly applied to all persons in the same station, was made his distinctive surname. Many of his acts were highly commendable. He repaired the watercourses, bricked the reservoirs, cleansed the drains, increased the sums paid by the publicans for the farming of the taxes, and diminished the contract prices paid by the State to the contractors of public works. More questionable reforms were those in regard to the price of slaves, dress, furniture, equipage, etc. His despotism in enforcing his own idea of decency may be illustrated from the fact that he degraded Manilius, a man of pretorian rank, for having kissed his wife in his daughter's presence in open day. Cato was a thoroughly dogmatic moralist, intolerant and stoical; great because he manfully contended with rapidly growing evils; yet not wise, because he opposed both the bad and the good in the innovations of his age with equal animosity.

In the year B.C. 175 Cato was sent to Carthage to negotiate as to the differences between the Carthaginians and the Numidian King Masinissa; but having been offended by the Carthaginians, he returned to Rome, where, ever afterwards, he described Carthage as the most formidable rival of the Empire, and concluded all his addresses in the Senate house—whatever the immediate subject might be—with the well-known words: "Ceterum censeo, Carthaginem esse delendam" ("Moreover, I vote that Carthage must be destroyed").

Though Cato was acquainted with the Greek language and its literature, his reactionary principles led him to denounce the latter as injurious to national morals. He died B.C. 149, at the age of 85. He was twice married. In his eightieth year his second wife, Salonia, bore him a son, the grandfather of Cato of Utica. In his old age Cato became greedy of gain, yet never once allowed his avarice to interfere with his honesty as a State functionary. He composed various literary works, such as *De Agri Cultura* (also known as *De Re Rustica*), which has been preserved entire. The best edition is by Kreil (Leipzig, 1884). His greatest historical work, the *Origines*, has, unfortunately, perished. It was an account of the beginning and development of the Roman State. Fragments of Cato's orations—of which as many as 150 were read by Cicero — are given in Meyer's *Oratorum Romanorum Fragmenta* (Zurich, 1842). As an orator, Cato was very famous, his style being natural, forcible, and racy to a degree. See Sears, *History of Oratory* (Chicago, 1896). Fragments from the lost works of Cato were published by Jordan (Leipzig, 1860.

CATO. The title of a tragedy by Addison (1713), the scene of which was laid in Utica, whither Cato had retired after the successes of Cæsar.

CATO. A *nom-de-plume* adopted by Alexander Hamilton and other Federalists in their articles written in support of the Jay Treaty with England in 1795.

CATO, Marcus Porcius, named Cato the Younger, or Cato Uticensis (from the place of his death) (B.C. 95-46). A Roman statesman and soldier. Having lost both parents during childhood, he was educated in the house of his uncle, M. Livius Drusus, and even in boyhood gave proofs of decision and strength of character. In B.C. 72 he served with distinction in the campaign against Spartacus, but without finding satisfaction in military life, though he proved himself a good soldier. From Macedonia, where he was military tribune in 67, he went to Pergamus in search of the Stoic philosopher Athenodorus, whom he brought back to his camp, and whom he induced to proceed with him to Rome, where he spent the time partly in philosophical studies and partly in forensic discussions. Desirous of thoroughly qualifying himself for the questorship, he commenced to study all the financial questions connected with it. Immediately after his election to this position (B.C. 65) he introduced, in spite of violent opposition from those interested, a rigorous reform into the treasury offices. He quitted the questorship at the appointed time amid general approbation. In B.C. 63 he was elected tribune and delivered his famous speech on the Catilinarian conspiracy, in which he denounced Cæsar as an accomplice of Catiline, and determined the sentence of the Senate. Strongly dreading the influence of unbridled greatness, and not discerning that an imperial genius like that of Cæsar was the only thing that could remedy the ills which afflicted the Roman Republic, he commenced a career of opposition to the most powerful men in Rome —Pompeius, Cæsar, and Crassus. Cato was a noble but strait-laced theorist, who lacked the intuition into circumstances which belongs to men like Cæsar and Cromwell. His first opposition to Pompeius was successful; but his opposition to Cæsar's consulate for the year 59 was of no avail. Soon after this date the Triumvirs, in order to rid themselves of his interference, ordered him to proceed to Cyprus and take possession of that island for Rome. On his return (B.C. 56), he was elected pretor, a position in which he fearlessly fought against corruption. When the open breach came between Cæsar and Pompeius, Cato sided with the opponents of Cæsar. At the time of the battle of Pharsalia (B.C. 48) he was holding Dyrrhachium for Pompeius. After the disaster he sailed for Africa with his troops in order to join Pompeius. Before his landing, the Triumvir had been murdered. Cato was elected commander by the Pompeians in Africa, but resigned the post in favor of Metellus Scipio, and undertook the defense of Utica. Here, when he had tidings of Cæsar's decisive victory over Scipio and Juba at Thapsus (April 6, B.C. 46), Cato, finding that his troops were wholly intimidated, advised the Roman senators and knights to escape from Utica and make terms with the victor, but prohibited all intercessions in his own favor. He resolved to die rather than surrender; and, after spending the night in reading Plato's *Phædo*, committed suicide by stabbing himself in the breast.

CATO, Valerius, or Cato Grammaticus. A Roman grammarian and poet of the First Century B.C. He lost his estate during the usurpation of Sulla, became an instructor to students of rank, and enjoyed great success, particularly as a trainer in the poetic art. In his later years he fell into extreme poverty, and was obliged to surrender to his creditors his splendid villa at Tusculum. Suetonius (*De Grammaticis*) states that, in addition to works on grammar, he wrote a short autobiographical narrative entitled *Indignatio*, and some poems, of which two—*Lydia* and *Diana*—were chiefly esteemed. The 183 hexameters called *Diræ in Batterum* were originally included in the minor poems of Vergil; later were attributed, with little reason, to Cato; and are now quite generally considered spurious. The text of the *Diræ* has been edited by Ribbeck (Kiel, 1867). Consult the essay by Naekius (Bonn, 1847).

CATOCHE, Cape. See Cape Catoche.

CATOP'TRICS (Fr. *catoptrique*, Gk. *κατοπτρικός*, *katoptrikos*, pertaining to a mirror, from *κάτοπτρον*, *katoptron*, mirror). That branch of geometrical optics which treats of the phenomena of light incident upon a surface and reflected therefrom. See Light.

CATOP'TROMAN'CY (Gk. *κάτοπτρον*, *katoptron*, mirror + *μαντεία*, *manteia*, prophecy). A sort of prophecy by the mirror or looking-glass. It first originated at Patras, in Greece, where the death or recovery of the sick was foretold by means of a mirror let down with a thread until its base touched the water in a fountain before the Temple of Demeter. The face of the sick person appearing healthy in the mirror betokened recovery; if it looked ghastly then death was sure to ensue. More modern superstitions attach ill luck to the breaking of a looking-glass, and to seeing one's face in a glass by candle-light. See Superstition.

CATORCE, kä-tōr'sā: *Sp. pron.* kä-tōr'thā, or Alamos de Catorce. A city of Mexico, situated in a barren district of the State of San Luis Potosí, 8700 feet above sea-level, 120 miles north of San Luis Potosí by rail (Map: Mexico, H 6). The town lies at the foot of a mountain 10,000 feet high, and is famous for its silver-mines, discovered in 1773. Population, 18,000.

CA'TO STREET CONSPIRACY. See Thistlewood Conspiracy.

CAT OWL (from the resemblance of the face to that of a cat). A name applied rather indiscriminately to several large owls, suggested by their cat-like eyes and feline habits. In the United States, probably the barred owl (*Syrnium nebulosum*) is the one most often so referred to. See Owl.

CATS, käts, Jakob (1577-1660). The best of the southern Dutch poets in the Golden Age of that literature, while it was being illustrated in the north by the varied genius of Vondel, Hooft, and Visscher. His poetry is characteristically Dutch in being extremely prosaic, commonplace in its metres, jejeune in language, monotonous in rhythms, and platitudinous in morals. A Dutch critic, Huet, has called him bitterly, "a personified mediocrity, a vulgar and vulgarizing spirit," somewhat suggestive of the English Tupper. Cats was the youngest of four children, and his mother died in his infancy. He was adopted by an uncle, studied law in Leyden, Orleans, and Paris, and began to practice it at The Hague, where he won reputation, but lost his health. He went to England, where he found no relief, and was at last cured in Holland by an alchemist. In 1603 he moved to Middelburg, and presently married Elizabeth van Valkenburg, whom he calls "a foundation for a home." Cats became active in civic life, and wrote his *Emblems of Fancy and Love; Maiden Duty* (1618); *Inward Strife* (1620); *Manly Respectability;* and *Marriage.* In 1621 he entered public life as pensionary of Middelburg, became pensionary of Dort in 1623, and curator of the University of Leyden in 1625. In this year appeared *Fidelity*, and in 1632 *Mirror of the Old and New Time.* In 1627 Cats went on an embassy to England, became Grand Pensionary of Holland in 1638, and Keeper of the Great Seal in 1645. These offices he resigned in 1651, and after a second embassy to England returned to literary work, in which for thirty years he had done little save the *Betrothal Ring* (1637). He now wrote *Age and Country Life; Court Thoughts;* and *A Life of Eighty-two*, growing old gracefully and keeping a joy in life to the last. His *Collected Works* were published in Amsterdam (19 vols., 1790-1800) and Zwolle (1856-62).

CAT'S-EYE. A semi-transparent mineral which, when cut with a convex face (*en cabochon*), shows a chatoyant effect. The name has been given to a greenish variety of chrysoberyl from Ceylon, where the Singhalese often carve it to resemble a monkey's face, taking advantage of the varying lights and colors of the stone to secure a grotesque likeness to that animal. Among the Hindus the cat's-eye was credited with the power of preserving and increasing its owner's wealth. The name cat's-eye was suggested by the peculiar play of light called *chatoyancy*, which is due to the internal striations of the composite crystals of which the mineral consists. The name is also given to an opalescent variety of quartz, especially when similarly cut, the effect in which is said to be due to the fibres of asbestos or actinolite. A *tiger-eye* variety from the Orange River of South Africa is an altered crocidolite in which the fibrous iron silicate has been replaced by a deposition of chalcedonic quartz on the fibres.

CATS'KILL. A village and county-seat of Greene County, N. Y., 34 miles south of Albany, on the Hudson River, at the mouth of Catskill Creek, and on the West Shore Railroad (Map: New York, G 3). It has communication by ferry with the opposite bank of the river, is connected by steamboat lines with New York and Albany, and is the starting-point of the Catskill Mountain Railroad. The village, frequented as a summer resort, though important rather as the point of departure for the more popular mountain resorts, has a court-house, opera-house, free academy, and public library. It manufactures woolens, hosiery, paper, bricks, etc. Catskill was settled about 1680 by Derrick Teunis Van Vechten. Population, in 1890, 4920; in 1900, 5484.

CATSKILL GROUP. A series of sandstones and shales of Upper Devonian age exposed along the western slopes of the northern Appalachian Mountains and named from the Catskill Mountains of New York, where they were first studied. The series was formerly supposed to constitute a distinct geological group overlying the Chemung group, but careful investigation has shown that the rocks of the Catskill formation are shallow-water deposits formed along the shore-lines of the northeast bay of the interior Devonian sea during periods while the normal marine sediments of the Hamilton, Portage, and Chemung groups were being laid down in the open and deeper waters that filled the western parts of the same bay. The name 'Catskill formation,' then, signifies a local littoral development or facies of the normal Upper Devonian formations, and as such it has no place in the geological time-scale. These Catskill conditions and sediments began in the Devonian of the eastern border of the basin at an earlier period than they did in the central and western portions, for the shoaling of the Devonian sea progressed from east to west. Because of this the Lower Catskill deposits of the Catskill Mountain region are of Hamilton age, the middle Catskill of the eastern border and the Catskill of the east-central part of New York State are of Portage age and known as the Oneonta formation, while the Upper Catskill of the eastern border and the Catskill rocks of the central part of the State are of Chemung age.

The rocks of the Catskill formation consist of shale and sandstone, with the latter often grading into coarse conglomerates, and their predominant colors are red, brown, greenish, and steel-gray. The sandstone, especially that of steel-gray color, often splits readily into thin horizontal layers and is then quarried for flagstone. The entire output of flagstone known as 'Hudson River bluestone' is obtained from the Catskill formation of Ulster, Delaware, and Greene counties, N. Y. As a rule the Catskill rocks are poor in fossil remains. Those most commonly found are the remains of land plants such as ferns, lepidodendrons, and trunks of coniferous trees. The most noteworthy fossil from this formation is a gigantic arthropod, Stylonurus (q.v.), an ally of the horseshoe crab (Limulus), which attained a length of five feet. Fragments, consisting of the dermal plates, spines, and teeth, of heavily armored fishes of the genera Bothriolepis, Coccosteus, and Holoptychius, which lived in the brackish and fresh waters of the coastal swamps, are found in certain red beds. A fresh-water clam, Amnigenia, is found in sandy shales of the Oneonta formation and occasional water-worn shells of marine mollusks and brachiopods occur in the lower beds of the Catskill Mountain region.

The Catskill sediments are approximately 4500 feet thick in the Catskill Mountains; they have their greatest development, with a thickness of 7500 feet, in the vicinity of Mauch Chunk, Pa., and from that region southward the formation diminishes in thickness until it disappears in Virginia. The formation is overlaid by the Pocono sandstones and conglomerates of similar origin, but of later (Carboniferous) age. The elevation of the continents that occurred toward the close of Devonian time was accompanied in Great Britain by the formation of very similar sediments there known as the Old Red Sandstone, made famous by the writings of Hugh Miller. This Old Red Sandstone bears to the normal marine Devonian of Great Britain the same relation as does the Catskill formation to the marine Devonian of eastern North America, and the similarity is still further marked in the identical physical characteristics of the rocks and the close resemblance of their contained fossil remains. See DEVONIAN SYSTEM; OLD RED SANDSTONE; STYLONURUS.

CATSKILL MOUNTAINS. A section of the Appalachian Mountain system, lying to the west of the Hudson River, and mainly confined to Greene and Ulster counties, N. Y. They cover an area about 50 miles long, north and south, and 30 miles broad, east and west (Map: New York, F 3). They are of old geological formation, their sides consisting of the sandstones and shales of the Catskill group of the Devonian system. The main line of elevations, which begins about 8 miles west of the Hudson River, extends nearly north and south for a distance of 12 miles and sends off several spurs to the west. Unlike the southern ranges of the Appalachians, the Catskills are not formed by parallel groups of mountains, each peak being more or less isolated from the neighboring summits. The slopes on the eastern side are precipitous, but toward the west there is a gradual decline to the level of the bordering highlands. The highest elevations are Mountain Slide, 4250 feet; Hunter Mountain, 4025 feet; Black Dome, 4004 feet; and Panther Mountain, 3800 feet. Deep gorges, locally known as 'cloves,' have been eroded by the branches of the Schoharie and Esopus creeks, and there are many cascades along their courses. Railroads cross the region, giving access to all sections. The beautiful views, fine summer and autumnal climate, and high altitude, make the region very popular as a summer resort. The mountains are, for the most part, covered with thick forests of oak, hickory, ash, maple, beech, pine, etc.

CATSKIN'S GARLAND, or THE WANDERING YOUNG GENTLEWOMAN. An old English ballad. It deals with the distress and restoration to happiness of a scullery maid, whose wretchedness is so great that she is obliged to clothe herself in catskins. It is really an Anglo-Saxon form of *Cinderella.*

CAT-SNAKE. The English name of a venomous opisthoglyph serpent (*Tarbophis vivax*) of southeastern Europe and Asia Minor, remarkable for several peculiarities of structure. It is small, dull-colored, and sluggish, and has grooved poison-fangs in the hinder part of the upper jaw. There are also long, recurved teeth in the lower jaw, which assist it in holding its prey (mainly lizards), while it chews at it until the venom stupefies the victim. See OPISTHOGLYPHA.

CAT'S-TAIL GRASS. See TIMOTHY GRASS.

CAT'S-TAIL REED. See TYPHA.

CATTARO, kät'tá-rō (Slav. *Kotor*). A seaport of the Austrian Crownland of Dalmatia, situated at the head of the Gulf of Cattaro, close to the Montenegrin frontier, and about 36 miles east-southeast of Ragusa (Map: Austria, F 5). It is strongly fortified, being protected on the gulf side by powerful batteries and on the land side by the almost inaccessible Fort San Giovanni, standing on a precipitous rock almost 1000 feet above the town, with which it is connected by a series of defensive works. Its principal trade is with Montenegro, with whose capital it is connected by a highway. Population, in 1890, 5400; in 1900, 5700. Cattaro, which was at one time a Roman colony under the name of Ascrivium, came in 1420 under the dominion of the Republic of Venice. In 1797 it passed to Austria, and in 1805 to the Kingdom of Italy, but was restored to Austria in 1814.

CATTARO, GULF OF, or BOCCHE DI CATTARO. An inlet of the Adriatic, near the southern extremity of the Dalmatian coast, in latitude 42° 27' N. (Map: Austria, F 5). It consists of three basins connected by straits of about half a mile in breadth. The outer entrance is only a mile and a half wide, and the total length of the gulf is about 18 miles. Mountains protect it from all winds, and it has sufficient depth to make it an excellent harbor. The scenery is magnificent.

CAT'TEGAT, or **KATTEGAT** (anc. Lat. *Sinus Codanus*), THE. The strait or sound separating the east coast of Jutland, Denmark, from the west coast of Sweden, and, by joining the Skagerrak on the west and the Little and Great Belts and the Sound on the east, forming the middle link in the chain of waters connecting the Baltic with the North Sea (Map: Denmark, E 2). It is about 150 miles long, and has a greatest width of about 90 miles. Its depths are very unequal, varying in the deepest portions in the western part from 40 to 65 feet, and in the eastern part from 100 to 200 feet. It offers dangers to navigation on account of its numerous shoals and the frequency of stormy winds. Its principal islands are Läsö, at the north, Anholt, near the middle, and Samsö, at the south. The eastern shores are steep and rocky, but those on the west are low.

CATTELL', JAMES MCKEEN (1860—). An American psychologist, born at Easton, Pa. He graduated at Lafayette College in 1880, and at the University of Leipzig in 1886, and was a lecturer at the University of Cambridge in 1888. From 1888 to 1891 he was professor of psychology at the University of Pennsylvania, from

1891 to 1896 professor of experimental psychology at Columbia University, and in 1896 was appointed professor of psychology in the latter institution. He is a member of many learned societies at home and abroad, and edits *Science* and *The Popular Science Monthly.*

CATTELL, William Cassidy (1827-98). An American Presbyterian divine and educator. He was born at Salem, N. J., August 30, 1827; graduated at Princeton College (1848) and at the theological seminary (1852); was professor of Latin and Greek in Lafayette College, Pa., 1855-60, and president from 1863 to 1883. His presidency evinced executive ability of a high order. He was secretary of the Board of Ministerial Relief of the Presbyterian Church from 1883 until his death, in Philadelphia, February 11, 1898.

CATTERMOLE, George (1800-68). An English water-color painter, born at Dickleborough, Norfolk. He first exhibited at the Academy in 1819. His pictures, which embrace a wide range of subjects, are remarkable for their striking originality of conception, vigorous execution, and fine color and tone. One of his best-known and greatest pictures is "Luther at the Diet of Spires," containing thirty-three portraits of the principal characters, copied from the authentic originals by the old masters. He also designed the engravings for his brother's *History of the Civil Wars* (1841-45), and illustrated many scenes in Scott's novels and in Shakespeare. His later works were chiefly oil paintings. Among his intimate friends were Thackeray, Dickens, Macready, Douglas Jerrold, Landseer, Browning, Macaulay, and Disraeli.

CAT-THYME, tīm. See Germander.

CAT'TI, or **CHATTI,** kăt'tī (Lat., from Celtic, connected, probably as an original totem-name, with O. Ir. *cat*, Welsh *cath*, Corn. *cath*, cat). A German people, included by Cæsar under the name Suevi (q.v.), who inhabited a country included in the present Hesse and the Prussian Province of Hesse-Nassau. The southwestern part of their territory, around Mattiacum, was conquered by the Romans under Drusus. The Catti took part in the general rising of the Germans under Arminius (Hermann). Tacitus praises them as excellent foot-soldiers. During the reign of Marcus Aurelius, in the end of the Second Century, they made incursions into Roman Germany and Rhætia. Caracalla failed in an expedition against them and the Alemanni in the Third Century. About the middle of that century their name began to give place to that of the Franks (q.v.), and is last mentioned by Claudian in the latter part of the Fourth Century.

CATTLE (OF. *catel*, from Med. Lat. *captale*, *capitale*, goods, property, from Lat. *capitalis*, important, relating to the head, from *caput*, head). The term cattle in its broadest significance includes not only horned animals, but horses, sheep, and nearly all kinds of domestic animals. In a more restricted and commonly accepted sense it is applied to the various breeds of meat or bovine animals belonging to the species *Bos taurus*, including the domestic ox, steer, and cow. Cattle seem to have been almost the first animals domesticated by man in the early period of the world's history, and also the most valuable and necessary to his highest welfare in all ages and stages of civilization since that time. The original wild type from which the various breeds of domestic cattle are descended is not well known. Through ancient sculptures and other records cattle can be traced back at least 4000 years, and the earliest evidences indicate that animals of different types were then known. (See Buffalo.) Variations evidently began at an early period, although no very high degree of development was effected by the ancients. Within the last two centuries especially, much attention has been paid to selecting and breeding cattle adapted to special conditions and purposes, and to developing the beef and milk producing qualities. It is stated that there are now in various parts of the world over one hundred distinct breeds of cattle. The principal and most valuable breeds of America have been derived from Great Britain and other portions of northwestern Europe. They are thought to have had a common origin in the wild cattle which existed in the ancient forests of Europe, of which Julius Cæsar, Pliny, and others wrote nearly two thousand years ago. The wild ox, whatever its origin, seems to have been formerly an inhabitant of many forest districts of Great Britain. The wild Chillingham cattle, which have been preserved for many generations in Chillingham Park, are the nearest representatives of these cattle extant. The most important results of man's agency in improving cattle by breeding, care, and management have been a tendency of the animals to mature at an earlier age, and readily to lay on flesh and fat, and an increase of the milk-production far beyond the needs of the calf, and prolongation of the natural period of milk-flow. At the present time the various recognized breeds of domestic cattle may be classified in a general way as beef cattle and dairy cattle.

Beef Cattle. The principal breeds of beef cattle in Great Britain and the United States are the Shorthorn, Hereford, Galloway, Devon, and Aberdeen-Angus. These breeds all originated in Great Britain, and for the most part took their names from the county or district whence they came. Alvord says: "The cattle which have been most famous as a breed in England and America, which have received the longest and closest attention of breeders and improvers, which have commanded prices, singly and in herds, far above all others, and which have made the greatest impression upon the live stock of both countries during the Nineteenth Century, are the Shorthorns or Durhams." The name *Shorthorns* was probably given to distinguish them from the rival race of Blackwell's Longhorns, which they soon surpassed. They are red and white cattle, the colors being variously blended and often roan, rectangular in outline and having horns of moderate length. They are notable for early maturity, beauty of form, quick fattening qualities, and minimum amount of waste in slaughtering. Although unsurpassed as beef cattle, many of the cows are good milkers, the best of any of the strictly beef breeds. The *Herefords*, originated in the county of Hereford, may be described as red with white on face, chest, belly, feet, and over the tops of the shoulders. They are close rivals or the equals of Shorthorns as beef cattle. They are inferior dairy cattle, many giving scarcely enough milk to raise a calf. The *Galloways* are jet-black and hornless, strongly built and rather low in stature. They are hardy in constitution and much esteemed for beef, but very poor dairy cattle. The *Aberdeen-Angus* are also hornless and black, and bear a general resemblance to the Galloways, but are longer legged, larger, and looser built. The cows are better milkers. The *Devons* are an exceedingly symmetrical, beautiful race, originated in North and South Devonshire. They are of a rich red color, and although the bulls and cows are rather small, the oxen grow to great size. The Devon oxen have long been prized as work animals. In regard to the relative merits of the different beef breeds no general conclusion can be safely stated. It is largely a question of individuality and the conditions to be met. There are good and bad examples of the beef type among all the breeds, and it is more important that the animal should approach the beef type in conformation and development, and be so bred as to fatten readily and slaughter to good advantage, than that he should belong to any particular breed. But as between beef breeds and dairy breeds or natives, there is a distinct advantage in favor of the former, which is due mainly to their marked superiority in yielding a large percentage of dressed weight on slaughtering, more advantageous deposition of the fat in the carcass, thicker and better marbled cuts of beef, and to what experts discern as 'quality.' The beef animal has been specifically designed for the most favorable production of the best meat, and while there are many cows which combine milk and beef production to a profitable degree, a good carcass of beef from a steer of a pronounced dairy type or breed is rarely seen. The beef type of animals is rectangular in outline, low, broad, deep, smooth, and even—no wedge-shape or sharp protruding spinal column is wanted for the block. According to Curtis, "Broad, well-covered backs and ribs are absolutely necessary to a good carcass of beef, and no other excellences will compensate for the lack of this essential. It is necessary to both breed and feed for thickness in these parts. And mere thickness and substance here is not all. Animals that are soft and patchy, or hard and rolled on the back, are sure to give defective and objectionable carcasses, even though they are thick, and they also cut up with correspondingly greater waste." A marked and important change has taken place in the profitable type of cattle within comparatively recent years. The present demand is for quality and finish rather than size. The heavy, inordinately fat or rough and patchy bullock has passed away under the demand for early maturity and plump, sappy carcasses of medium weight and minimum offal and waste. The modern type makes beef at decidedly more profit and economy to both the producer and the butcher, and furnishes the consumer a far superior article.

Dairy Cattle. In no line of improvement of live stock have more remarkable results been attained than in the case of the dairy cow. This improvement has taken place in the earliness of maturity, the length of the milking period, the quantity and richness of the milk produced, and the general economy of production. In the modern dairy cow the tendency to lay on flesh, so highly developed in beef animals, has been largely eliminated, and in its place the ability to convert economically the food eaten into milk has been cultivated in a high degree. Continued breeding to a special purpose has changed the former short milking period, limited almost to the pasture season, to a comparatively even flow of milk during ten or eleven months of every year. A cow that does not average six or seven quarts of milk a day for 300 days in the year, aggregating 4000 pounds, is not considered very profitable. There are many herds having an average yearly production of 5000 pounds per cow, and single animals are numerous which give ten or twelve times their own weight in milk during a year. Quality has been so improved that the milk of many a cow will make as much butter in a week as did that of three or four average cows of the middle of the last century.

The points observed in judging dairy cows are shown in the accompanying illustration, taken from a publication of the United States Department of Agriculture.

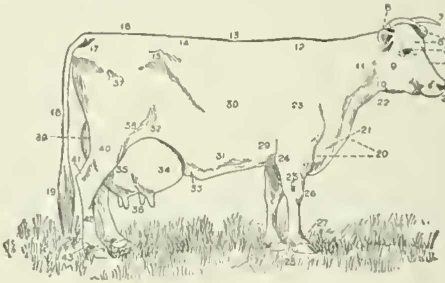


DIAGRAM OF COW SHOWING POINTS.

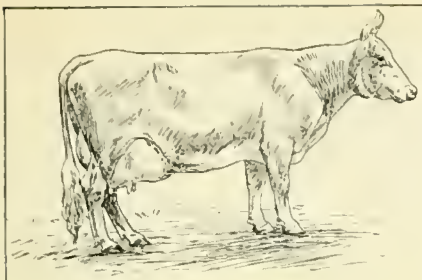
1. Head.
2. Muzzle.
3. Nostril.
4. Face.
5. Eye.
6. Forehead.
7. Horn.
8. Ear.
9. Cheek.
10. Throat.
11. Neck
12. Withers
13. Back
14. Loins
15. Hip bone
16. Pelvic arch
17. Rump
18. Tail.
19. Switch
20. Chest
21. Brisket
22. Dewlap
23. Shoulder
24. Elbow
25. Forearm
26. Knee
27. Ankle
28. Hoof.
29. Heart girth
30. Side or barrel
31. Belly.
32. Flank
33. Milk vein
34. Fore udder.
35. Hind udder.
36. Teats
37. Upper thigh
38. Stifle
39. Twist.
40. Leg or gaskin
41. Hock.
42. Shank
43. Dew claw

Different scales of points have been adopted by the various breeders' associations.

The breeds of dairy cattle most common in the United States and England at the present time are Ayrshire, Holstein, Guernsey, Jersey, Red Poll, and Shorthorns. The *Ayrshires*, named for the county of that name in the southwest of Scotland, are medium-sized cows, short-legged, fine-boned, and very active. The general form is the wedge shape, regarded as typical of cows of dairy excellence, and good specimens are thin when in milk. The prevailing color is red and white, in spots variously proportioned, but not mixed. The cows are large and persistent milkers, but the milk is not particularly rich, and the fat-globules are small, which causes the cream to rise slowly. An average yield of 5500 pounds of milk a year per cow for a working herd is often realized. One noted herd has an average for nineteen years of over 6100 pounds per cow, and individuals produce 10,000 and even 12,000 pounds a year. Butter records are not numerous, but herds average 300 to 400 pounds a year, and there are individual records of as high as 600 pounds.

The *Jersey* and *Guernsey* breeds were both originated in the Channel Islands, but in the

DAIRY CATTLE



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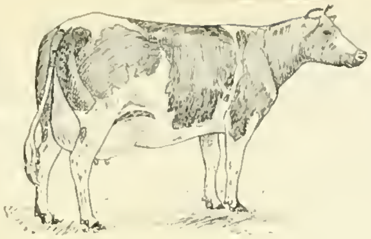

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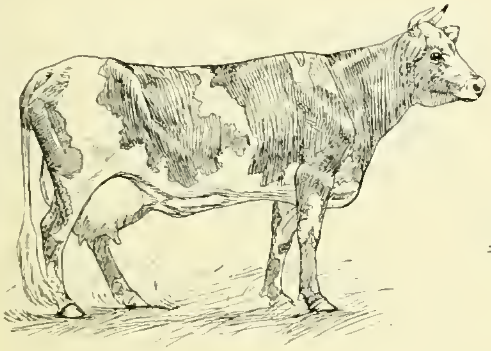

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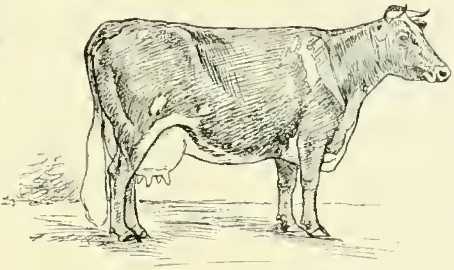

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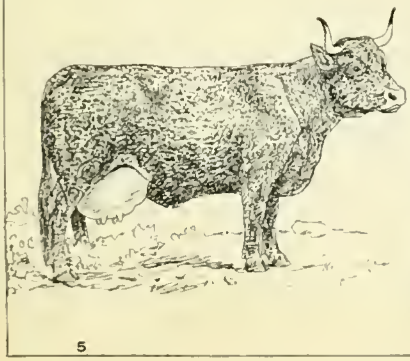

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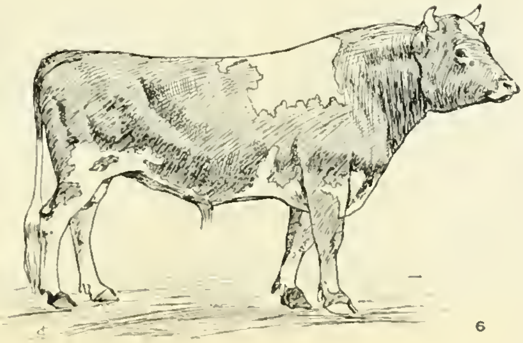

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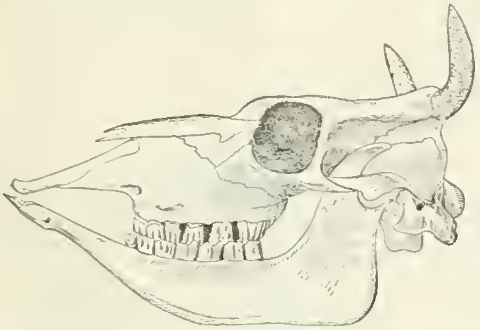
1. AYRESHIRE COW, "Red Rose" No. 5566.
2. HOLSTEIN-FRISIAN COW, "Jamaica," No. 1336.
3. JERSEY COW, Modern type.
4. SHORT-HORN COW, "Kitty Clay," 4th.
5. BROWN SWISS COW, "Brienzl," No. 168.
6. GUERNSEY BULL, Modern type.

development of the latter more of the characteristics of the parent stock of Normandy have been retained. They were both formerly called Alderneys. The Guernseys are rather larger than the Jerseys, stronger boned, and are claimed to be hardier. They are light in color, with darker shades approaching brown, and have a yellow skin. The milk of both breeds is unusually rich in fat, the fat-globules being large and separating readily in creaming. The Guernseys are liberal milkers. At home the average cow is expected to produce 5000 pounds of milk and 300 pounds of butter a year without high feeding. In the United States they are usually fed higher, and respond accordingly. There are records of several herds which have averaged over 6000 pounds of milk and 350 pounds of butter a year. Individual cows have produced 10,000, and nearly 13,000 pounds, of milk, and 500 to 700 pounds of butter a year. The *Jerseys* are the smallest of the better dairy breeds, though in the United States they have been considerably increased in size. The color varies from cream to various shades of fawn, tan, and mouse-color, dark brown and even black. They have beautiful heads, with intelligent faces, and rather small, close horns. The body is well rounded, with capacity for food and breeding, and the udder is of good size, with highly developed milk-veins. They are irregular in outline and thin in flesh. Like the Guernseys, they are not large, but persistent milkers, and their milk is the richest of any breed. For many years they have been bred especially for butter-production, although American breeders have striven with considerable success to increase the milk-yield without diminishing the quality. Good herds produce from 3500 to 4500 pounds of milk a year, and several herd records show averages of 6000 and 7000 pounds per cow. Single cows produce 1000, 1200 pounds of butter, and even more. There are numerous records of 25 to 30 pounds of butter a week, and individual records run all the way from 600 to 800, and even 1000 pounds of butter in a year. Jerseys are heavy feeders, and as a rule will bear high feeding and forcing for long periods unusually well. Brown Bessie, the famous champion butter cow of the Chicago World's Fair dairy test, averaged over 40 pounds of milk a day for five months, and made 3 pounds of butter a day several times. The *Holsteins*, or *Holstein-Friesians*, of north Holland and Friesland, are black and white, irregularly marked, but not mixed, large in frame, strong, and usually in good flesh. Their legs are long and rather small, and the udder is often of extraordinary size, in conformity with the reputation of the breed for enormous milk-production. It is not unusual for a cow to give more than her own weight in milk every month for ten or twelve consecutive months, and there are numerous instances of yields of 100 pounds or more a day, and 20,000 to 30,000 pounds a year, although 40 to 60 pounds a day, or 7500 to 8000 pounds a year, is considered an average. But the milk is usually relatively poor in fat as compared with that of other breeds, and does not always come up to the State or municipal standards in this respect. The fat-globules are quite small and the cream does not rise readily on setting. There are some families of Holsteins, however, which give milk of fully average richness and are profitable butter-producers.



SKULL AND TEETH OF THE COW.

Dentition of a young Jersey cow, showing the small incisors and canines crowded in the extremity of the lower jaw (none in the upper jaw), and the great grinders (molars and premolars).

The *Red Polls* are a comparatively new breed, resembling the Devons, hornless, and inclined to the beef form. They are only fair dairy cattle, being in the class of breeds which aim to serve the dual purpose of milk and beef production. The *Shorthorns*, described above as beef cattle, although a typical beef breed, are to some extent dual-purpose animals, and some families have been notable for milk-production. In the best milking strains the cows are rather more 'rangy' and angular in outline than the beef types, with large, hairy udders. The Shorthorns made a surprisingly good showing in the World's Fair breed test (1893), and records of several herds in the United States show a milking period of 275 days and an average production of 6500 pounds of milk.

Formerly certain dairy breeds were considered especially adapted to cheese-making, and others to butter-making, and the two qualities were supposed to be to a certain extent incompatible. The agricultural experiment stations have shown, however, that this is not the case, but that the value of milk for cheese-making as well as for butter-making is measured by its fat content. The richness of the milk in fat is to some extent a breed characteristic, although within the breed the variations in this respect are quite wide in the case of different cows. The following averages of a large number of analyses of milk from cows of different breeds are something of an indication of the composition:

COMPOSITION OF MILK OF DIFFERENT BREEDS

BREED	Water	Total solids	Fat	Casein and albumin	Milk-sugar	Ash
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Ayrshire	86.93	13.07	3.58	3.42	5.43	0.64
Holstein	87.62	12.38	3.46	3.39	4.84	0.74
Guernsey	85.39	14.61	5.12	3.61	5.11	0.75
Jersey	84.60	15.40	5.61	3.91	5.15	0.74
Shorthorn	87.20	12.80	3.47	3.21	5.43	0.69

Attempts to determine by experiment which is the best dairy breed have not been entirely satisfactory or convincing, on account of the large number of factors which have to be taken into account in determining this, aside from the yield and composition of the milk, such as hardiness, constitution, adaptability to given conditions, feed requirements and economy, ultimate value for beef, etc. The results are chiefly of interest as showing what the different dairy breeds have done under uniform conditions. The experiment stations in Maine, New Jersey, and New York have made the most extensive breed tests of any in the United States, and the results have been compiled by Prof. F. W. Woll as follows:

COMPARISONS OF BREEDS OF COWS AT AMERICAN EXPERIMENT STATIONS

BREED	Cows included	Lactation periods	Average yields per lactation period		Average fat content of milk	Average cost of		
			Milk	Butter fat		Food eaten per day	Producing 100 pounds of milk	Producing 1 pound of fat
	Number	*Number*	*Pounds*	*Pounds*	*Per cent.*	*Cents*	*Cents*	*Cents*
Ayrshire	10	20	6,909	248.5	3.60	14.5	78.5	21.5
Devon	3	5	3,984	183.3	4.60	10.3	94.0	20.5
Guernsey	8	10	6,210	322.9	5.20	13.5	82.8	15.8
Holstein-Friesian	9	10	8,215	282.0	3.43	17.2	74.7	21.5
Jersey	9	18	5,579	301.1	5.40	13.9	94.7	17.4
Shorthorn	4	5	8,696	345.4	3.97	14.3	78.7	19.4
Total	43	68	......	.. ...	......	......	......	......

The Chicago World's Fair breed test was the most famous test of its kind ever conducted. Although open to all breeds, only the Guernsey, Jersey, and Shorthorn breeders' associations entered the competition, and they selected the best cows of their respective breeds to be found. The results of the butter and cheese tests with these three breeds are summarized as follows:

WORLD'S FAIR BREED TESTS, 1893

No. 1, Cheese Test, 15 Days, May

COWS IN TEST	Milk produced	Fat in milk	Cheese made	Price of cheese per pound	Cost of feed	Net gain
	Pounds	*Pounds*	*Pounds*	*Cents*	*Dollars*	*Dollars*
25 Jerseys	13,296.4	601.91	1,451.8	13.36	98.14	119.82
25 Guernseys	10,938.6	488.42	1,130.6	11.95	76.25	88.30
25 Shorthorns	12,186.9	436.60	1,077.6	13.00	99.36	81.36

No. 2, 90-day Butter Test, June, July, August

COWS IN TEST	Milk produced	Fat in milk	Butter credited	Proceeds of butter	Cost of feed	Net gain
	Pounds	*Pounds*	*Pounds*	*Dollars*	*Dollars*	*Dollars*
25 Jerseys	73,488.8	3,516.08	4,274.01	1,747.37	587.50	1,323.81
25 Guernseys	61,781.7	2,784.56	3,360.43	4,355.44	439.14	997.64
24 Shorthorns	66,263.2	2,409.97	2,890.87	1,171.77	501.79	910.12

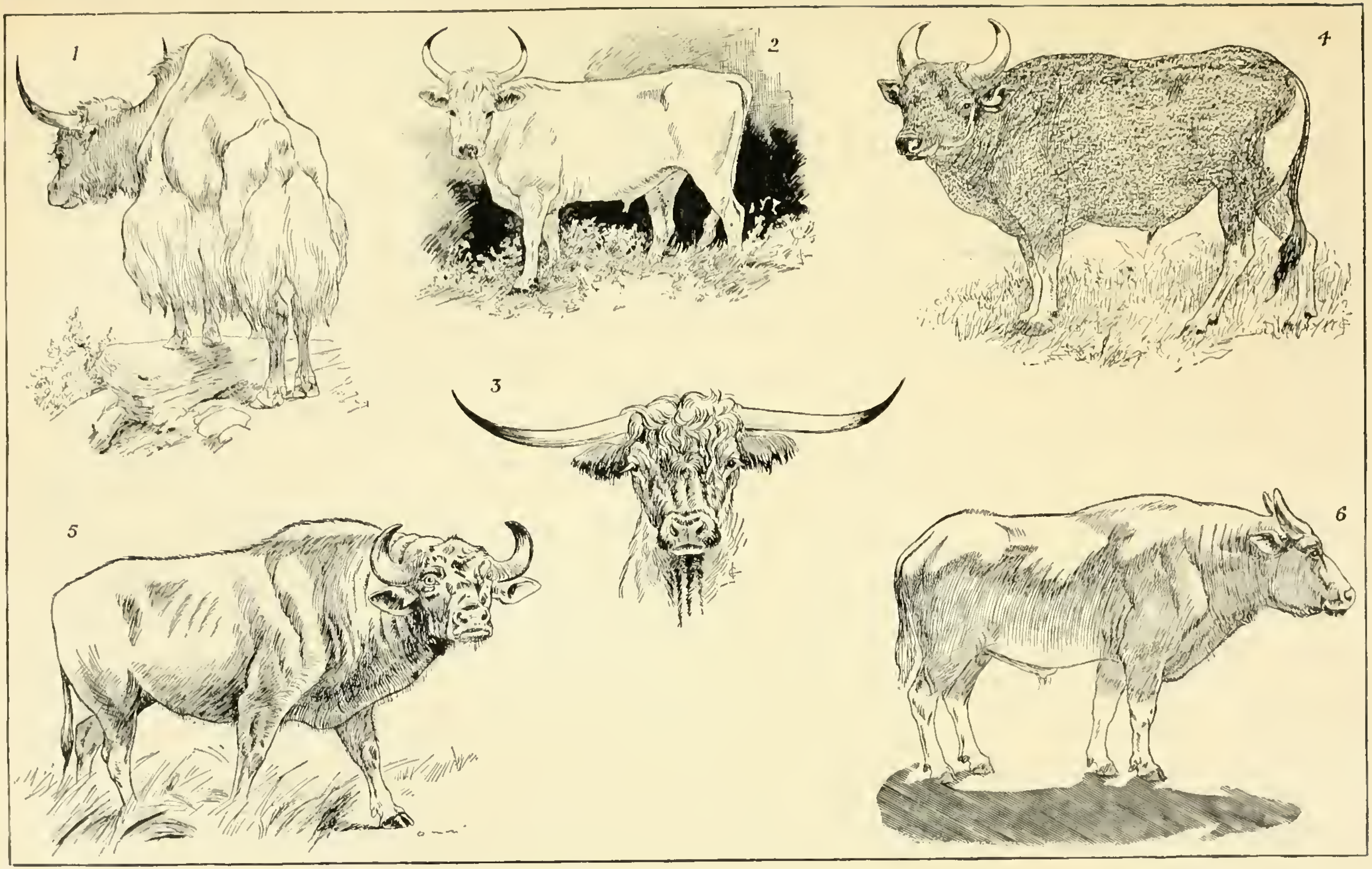
No. 3, 30-day Butter Test, September

COWS IN TEST	Milk produced	Fat in milk	Butter credited	Proceeds of butter	Cost of feed	Net gain
	Pounds	*Pounds*	*Pounds*	*Dollars*	*Dollars*	*Dollars*
15 Jerseys	13,921.9	685.81	837.21	385.59	111.24	274.13
15 Guernseys	13,518.4	597.96	724.17	329.77	92.77	237.00
15 Shorthorns	15,618.3	555.43	662.67	303.69	104.55	198.89

The various breeds continue to have their advocates and admirers, and each breed has some points of advantage. The pure bred stock, however, comprise only a very small fraction of the dairy cows of the United States and Canada. The larger part of the cows are *grades*, i.e. crosses of natives or ordinary cows with pure breeds. Among these are many excellent animals, rivaling the thoroughbreds in amount and economy of milk-production. Much attention is now being given by dairymen to testing the individual cows of their herds, determining which are the most profitable ones, and gradually eliminating the inferior ones. In this way an improvement of the ordinary stock is going on which, in some sections, has already raised the cows to a high degree of excellence and will ultimately result in a much higher standard for good dairy cows.

The following books treat of the history, breeds, and management of cattle: Sanders, *The Breeds of Live Stock* (Chicago, 1887); G. W. Curtis, *Horses, Cattle, Sheep, and Swine* (New York, 1893); Wallace, *Farm Live Stock of Great Britain* (Edinburgh, 1889); Flint, *American Farmer* (Hartford, Conn., 1884); Alvord, "Breeds of Dairy Cattle," in *United States Department of Agriculture Farmers' Bulletin 106* (Washington, 1898); Coleman, *Cattle, Sheep, and Pigs of Great Britain* (London, 1887); T.

WILD CATTLE



1. YAK (Bos grunniens).
2. CHILLINGHAM WHITE BULL.
3. HEAD OF HIGHLAND BULL.
4. BANTENG (Bos sondaicus)
5. GAUR (Bos gaurus).
6. GAYAL (Bos frontalis).

McKenny Hughes, *On the More Important Breeds of Cattle Which Have Been Recognized in the British Isles, and Their Relation to Other Archæological and Historical Discoveries* (Westminster, 1896); Oskar Knispel, *Die Verbreitung der Rinderschläge in Deutschland, nebst Darstellung der öffentlichen Zuchtbestrebungen* (Berlin, 1897); Richard Lydekker, *Wild Oxen, Sheep, and Goats of All Lands, Living and Extinct* (London, 1898); A. Lydtin and H. Werner, *Das deutsche Rind; Beschreibung der in Deutschland heimischen Rinderschlage* (Berlin, 1899). See also FEEDING FARM ANIMALS; DAIRYING; BREEDS AND BREEDING; and Plate of WILD CATTLE.

CATTLE, CHILLINGHAM. A breed of the so-called wild cattle of Great Britain (*Bos taurus*, var. *scoticus*), preserved in Chillingham Park, Northumberland, England. This park, the property of the Earl of Tookerville, is a remnant of one of the great forests of Great Britain. It was formerly believed that these cattle, other herds of which are found at Cadzon, near Chillingham, at Chartley (Staffordshire), Somerford and Lyme (Cheshire), and Kilmory (Argyllshire), were descended from the urus (q.v.) without contact with any domesticated breed, but it is now held that the remote ancestors of the existing animals must have been partially domesticated. The Chillingham cattle, which approach most nearly to the true *primigenius* type, number about sixty, and are described as of medium size, compact in body, and dingy-white in color, with black-tipped horns, brownish muzzle, and red ears. They are timorous, unless hard-pressed, and feed by night. The cows conceal the calves under tall ferns and undergrowth, and resist all approach to them. It is said that these cattle refuse to mingle with any other. This prevents degeneracy of breed, and the accepted characteristics are also maintained by destroying any calf that shows deviations of color. For illustration, see Plate of WILD CATTLE.

CATTLE-GUARDS. See RAILWAYS.

CATTLE PLAGUE, RINDERPEST (Ger.), or STEPPE MURRAIN (Fr., *peste bovine*). A contagious eruptive fever or exanthema common among animals of the bovine species; sheep, goats, deer, and other allied species occasionally, however, catch it from cattle. Pigs, horses, carnivora, and man are immune to the disease. It occurs indigenously on the plains of western Russia and throughout Asia, whence it has at various times overspread most parts of the Old World. As in smallpox, scarlatina, and other eruptive fevers, an incubative stage, varying between two and twenty days, intervenes between the introduction of the virus into the system by either inoculation or contagion, and the development of the characteristic symptoms. These consist essentially of congestion of the mucous and cutaneous surfaces, with a sort of aphthous eruption, and thickening, softening, and desquamation of the superficial investing membrane. The disease runs a tolerably fixed and definite course, which is not materially altered by any known remedial measures. It seldom attacks the same individual a second time.

HISTORY. The cattle plague has been recognized for upward of a thousand years. It appears to have destroyed the herds of the warlike tribes that overran the Roman Empire during the Fourth and Fifth centuries. About 810 it traveled with the armies of Charlemagne into France, and about the same period is also supposed to have visited England. Several times throughout the course of every century it spread from the plains of Russia over the western countries of Europe, and is stated to have again visited England about 1225. Although causing every few years great losses on the Continent of Europe, the plague does not appear to have again shown itself in England until 1714, when it appeared at Islington, about the middle of July, and was very destructive for about three months, but was again got rid of toward the end of the year. In 1744 it was in Holland, destroying there, in two years, 200,000 cattle; in Denmark, from 1745 to 1749, it killed 280,000; in some provinces of Sweden it spared only 2 per cent. of the horned cattle. It made terrible havoc throughout Italy, destroying 400,000 animals in Piedmont alone. In April, 1745, the plague was again imported into England, probably by some white calves from Holland. It continued its devastation for twelve years, but it is now impossible accurately to determine the losses it occasioned. In the third and fourth years of its ravages 80,000 cattle were slaughtered, and double that number are supposed to have died. In 1747 40,000 cattle died in Nottingham and Lancashire alone; while so late as 1757 30,000 perished in Cheshire in six months. In March, 1770, the disease was brought with some hay from Holland to Portsoy, in the Moray Firth, several cattle died, and others to the value of about £800 being destroyed, the further spread of the pest was prevented. By the wars which wasted Europe toward the close of the Eighteenth and first eighteen years of the Nineteenth Century, cattle plague was spread widely over the Continent, and occasioned, wherever it occurred, terrible losses. Since then, at short intervals, it has spread—always being traceable to its source on the Russian plains—over Poland, Hungary, Austria, Prussia, portions of Germany, and Italy, and has extended to Egypt. The following are the records of its destructive career during this outbreak:

	Attacked	Killed	Died	Recovered
England.........	223,672	102,740	90,450	21,589
Wales............	8,388	1,180	5,794	1,117
Scotland.........	46,863	6,263	28,088	10,707
Total...........	278,923	110,183	124,332	33,413

To this total must be added 11,000 cases known to have been attacked and unaccounted for, and upward of 60,000 healthy cattle slaughtered to prevent the spread of the disease. Plague was again imported into Hull in 1872, with cattle from Cronstadt; it spread into several districts of the East Riding, attacked 72 animals, 51 of which were killed and 21 died. In 1877 an outbreak took place in Germany, but by energetic measures was speedily suppressed without extensive losses. The most extensive losses, however, have occurred on the steppes of Russia, and in Turkestan, Persia, China, Japan, Java, Central Africa, and Bechuanaland. In the last-named country 1,200,000 cattle died of plague. At the present time (1902) the disease is especially destructive in Asia and Africa.

Causes. Faulty hygiene, by lowering vitality, probably renders animals more prone to the attack and less able to bear up against it. Like hydrophobia, smallpox, or syphilis, it is developed only by special virus. This virus occurs abundantly in the blood of every plague-stricken beast, in the discharge from its nostrils, mouth, or eyes, in the off-scourings from the bowels, probably even in the breath. It may be transferred to healthy beasts by inoculation. A little of the blood or nasal or other mucous discharges of a plague case, if introduced underneath the skin of a healthy cow, develops the disease within a few days. The transference of the virus or contagion from the sick to the sound animal is not always so direct and evident. As with other contagious diseases, the virus may be carried considerable distances in the air; it may adhere to the food that has lain before infected beasts; to the litter from the stalls, or even after it has been heaped for weeks; to the clothes of attendants; to the floors, walls, or stalling of buildings; or to imperfectly cleansed cattle-cars. It may gain access to the blood probably through the air-passages, perhaps also by absorption through the mucous surface of the bowels, or even through the skin.

Symptoms. In from three to six days after an animal has been exposed to the virus of cattle plague, or from 36 to 48 hours after being purposely inoculated, the temperature of the body is raised several degrees. A delicate thermometer introduced into the vagina or rectum, instead of marking about 101° F., indicates 104° to 106°. Two or three days later a striking dullness is manifested, and the animal becomes indifferent to surroundings. The pupils of the eyes are contracted, and the animal may be in a state of vertigo or coma. Within 12 to 24 hours the milk-secretion is diminished by one-half or two-thirds, the mucous membrane of the mouth is generally observed to be slightly reddened, and soon a granular, yellowish-white eruption, consisting of thickened epithelium cells and granules, appears on the gums round the incisor teeth, and by and by on the lips and dental pad. Some hours later the same eruption extends to the cheeks, tongue, and hard palate. Within 48 hours a crust of epithelium covers the gums, lips, and mouth, and then, wiped away or accidentally rubbed off, leaves the abraded membrane red and vascular and exhibiting patches of erosion. The membrane lining the vagina indicates very similar appearances; it is reddened and vascular, dotted with grayish, translucent elevations about the size of rape-seeds, covered with a whitish-yellow, usually sticky discharge, and occasionally marked with patches of excoriation. The skin is dry; there is hence a perverted development of scarf-skin, and of the oleaginous secretion of the irritated sebaceous glands. The skin is thus invested with yellowish scales; while on its thinner portions—about the lips, between the thighs, and on the udder—there are papular eruptions or elevations. The animal hangs its head, arches its back, the eyes are leaden and watery, and from both eyes and nose there latterly comes a dirty, slimy discharge. Appetite and rumination are irregular. The breathing is oppressed; expiration is prolonged and accompanied by a peculiar grunt. The pulse is small and thready, and is quickened as death approaches. The bowels, usually confined at first, become, toward the sixth or seventh day, much relaxed; the discharges passed, often with pain and straining, are profuse and liquid, offensive, acrid, pale-colored, and occasionally mixed with blood. The patient loses weight and strength, totters if it attempts to walk, and prefers to lie rather than to stand. Death usually occurs within from two to seven days, and is preceded by muscular twitchings, a peculiar, offensive smell, a cold, clammy state of body, moaning, grinding of the teeth, and rapidly increasing prostration.

Prognosis. Cases usually terminate unfavorably when the animal's temperature falls rapidly; the pulse becomes small, quick, and weak; the breathing more difficult, distressed, and moaning; the diarrhœa increased, and the depression more notable. A more favorable termination may be anticipated when, after the fifth day, the heightened temperature, so notable even from the earliest stages, abates gradually; the breathing becomes easier, the pulse firmer, the visible mucous membranes appear healthier, and patches of extravasation or erosion speedily disappear.

Sheep do not take rinderpest spontaneously, and even when kept with diseased cattle, or inoculated with cattle-plague virus, they do not catch the disease so certainly as do cattle. When diseased, they exhibit, however, very similar symptoms; but Professor Röll and other observers record that upward of 40 per cent. recover. Goats, deer, antelopes, gazelles, yaks, and, indeed, all animals taking rinderpest exhibit with tolerable uniformity the same characteristic symptoms.

Post-mortem Appearances. The mucous membranes are generally deeper-colored than natural, are congested, softened, marked in places with the same granular patches discoverable during life within the mouth of the vagina, and in bad cases exhibit œdema, hemorrhage, and sloughing. The first three stomachs sometimes contain a good deal of food, but show less declension from health than does the fourth stomach, the mucous membrane of which is dotted with spots of congestion and extravasation. The coats of the bowels are thinned and easily torn. The mucous coat, especially toward the middle of the small intestine, the opening into the cæcum and posterior half of the rectum, is much congested, bared of epithelium, and sometimes marked with blood-spots, but never ulcerated. Peyer's glands, so generally inflamed in the somewhat analogous typhoid fever of man, are perfectly healthy. The liver is yellow, and the gall-bladder contains an abundance of fluid. The respiratory mucous membrane, like the digestive, is vascular, and marked with submucous hemorrhage; the lungs are generally emphysematous, the heart often marked with blood-spots. The urino-genital, like the other mucous membranes, is congested in females, especially toward the lower part of the vagina and vulva; the kidneys are enlarged and hemorrhagic in the cortical zone; the serous membranes and nervous centres are perfectly unchanged. As in other septicæmic diseases, a considerable increase in the number of white blood-corpuscles is observed. The blood itself is dark in color; in the later stages it contains less water, probably owing to the draining diarrhœa, and about double its usual proportion of fibrin. The muscular tissues are softened, easily broken down, and contain an abnormal amount of soluble albumen. The urine is little altered in quantity, but from the first rise in the animal's temperature it contains an increase of urea varying from 5 to 15 per cent. The chief change in the milk is its rapid diminution in quantity and the increase of its fatty matters. The bile is watery, offensive, and prone to decomposition.

Treatment. Cattle plague is proved to be an eruptive fever. When the specific virus has entered the body of a susceptible subject, no medicinal treatment has yet been discovered which can destroy it or materially shorten or mitigate its effects. Until such an antidote is found, there can be no hope of certain cure. The British cattle-plague commissioners collected information regarding the four following methods of treatment—namely, the antiphlogistic, the tonic and stimulant, the antiseptic, and the special. Diverse as are these systems, the percentages of recoveries—varying from 25.83 to 27.45 — were so nearly alike that it is fair to conclude that no one of the systems tried exercised any notable influence in checking the mortality. Partly, perhaps, from the varying virulence of the plague, partly from the differences in the nursing and care bestowed on the animals, the proportion of recoveries has varied greatly in different localities. Rational treatment is limited to warding off untoward symptoms, to careful nursing, and husbanding the failing strength. It must, however, be remembered that throughout the progress of the disease there is constant spreading of the infection to healthy cattle. Hence, plague subjects should be immediately destroyed. Except, therefore, for purely scientific purposes, and with careful precautions to prevent the spread of the disease, it is unwise to attempt remedial treatment. Where, however, a beast is to have a chance of recovery, so soon as the elevated temperature indicates the accession of the disease solid, indigestible food should be withheld, and the patient restricted to mashes, gruel, boiled linseed, malt, and other food which can be digested without the necessity for rumination. Where the bowels at the outset are costive, a dose of oil or a very small quantity of some saline purgative may be required. Cold water, gruel, mashes, or stale bread soaked either in water or beer should be offered at short intervals throughout the attack. The animal, kept in an atmosphere of about 60°, should be comfortably clothed and have its legs bandaged. The hot-air bath and wet packing have been repeatedly tried; but although probably useful in the earlier stages, appear, when the disease is fully established, to harass and weaken the patient. Small and repeated doses of sulphite of soda have in some cases proved useful, and may be conjoined with carefully regulated, moderate doses of such stimulants as ale, whisky and water, sweet spirit of nitre, spirit of ammonia, or strong coffee. It is most important, however, that these and other such medicines should be drunk by the animal of its own accord in the gruel, water, or mashes, as forcible drenching always disturbs the patient. The inhalation of chloroform, although temporarily relieving the distressed breathing, does not appear to exert any permanent benefit.

Prevention. From what has been stated regarding the nature of cattle plague, it must be evident that its prevention can be effected by the destruction of the specific virus, or by removing beyond its influence all animals on which it might fasten. Neither should sheep, fresh hides, hay, nor any other fodder and litter from countries where this ruinous plague exists, or has recently existed, be imported without first undergoing thorough disinfection. In England importations of cattle plague are guarded against by the provisions of the contagious diseases (animal) acts (1869 and 1878). Neither cattle, sheep, nor pigs, fodder, litter, nor hides can be landed from countries where the plague exists, or from places in direct communication with such infected countries. All foreign stock is inspected at the ports of debarkation, and inspectors have orders for the immediate slaughter and disinfection of cattle-plague subjects and of any animals with which they have been in contact. As in the case of many other infectious diseases, prevention of cattle plague is most successfully accomplished by producing immunity through inoculation. Immunization has been produced by natural virus and by virus which has been modified experimentally. Koch's method consisted in giving hypodermic inoculations of pure bile from plague subjects. According to the method of Edington, one part of bile was mixed with two parts of glycerin, and after ten days an injection of virulent blood diluted in water was given. Danisz and Bordet have experimented in the Transvaal with an immunizing serum. Turner and Kolle succeeded in producing an immunity which lasted for several months. Their method consisted in giving simultaneous injection of virulent blood on one side of the animal and serum on the other. Immunity was also obtained by successive inoculations of virulent blood and serum. Cattle plague does not occur in the United States. Texas fever has been confounded with it by some authors, but these diseases are of quite different nature. Contagious pleuro-pneumonia has also been confounded with cattle plague. In Turkey cattle plague was found closely associated with aphthous fever and Texas fever. Consult: Gamgee, *The Cattle Plague* (London, 1886); Nocard and Leclainche, *Les maladies microbiennes des animaux*, 2d ed. (Paris, 1898); Turner and Kolle, *Report on Cure and Prevention of Rinderpest*, Agricultural Department, Cape of Good Hope (Cape Town, 1898); *Great Britain Cattle Plague Commissioners' Reports I., II., III., IV.* (London, 1865).

CATTLE TICK. See Texas Fever.

CAT'TY (Malay, Javanese *kātī, katī*, pound). The unit of weight largely used throughout Chinese and Malayan Asia, and by the Chinese all over the world. A catty is 1⅓ pounds avoirdupois.

CAT'TYWAR'. See Kathiawar.

CATUL'LUS, Gaius Valerius (c.87-c.54 B.C.). The greatest of the Roman lyric poets. He was born in Verona, of a respected and well-to-do family. Very little is known of his personal life, though much may be learned from his poems, which are intensely subjective. He settled in Rome in early life, and was on terms of familiarity with the leading men of the day—Cæsar and Cicero among them—though he was himself in rather moderate circumstances, at least from the point of view of a *bon vivant* who required wealth to gratify his needs. In Rome he formed a passionate attachment for a woman whom he celebrates in his verse under the name of 'Lesbia.' There is little doubt that she was Clodia, the amorous and licentious sister of Cicero's enemy, P. Clodius Pulcher. This was the consuming passion of his life, and the theme of many of his finest lyrics, in which we have the throbbing life of an emotional yet not quite mature genius. In them we read the story of his earlier hopes and joys, then his jealousy, his quarrels and reconciliations, and at last his awakening to the bitter truth, and his despair when he fully came to recognize the shamelessness and open infidelity of the woman whom he loved. Catullus is intensely personal in his poetry and utterly without reserve; and many of his shorter poems breathe the deepest affection for his friends, with the most stinging invective for his enemies. The spirit of his love poetry is that of the modern decadent Italian; so that in style, in temperament, and in imaginative eroticism, Catullus is the literary prototype of Gabriele d'Annunzio. His longer poems are largely based on Alexandrian Greek models. The most notable are the two *epithalamia*, or marriage songs—one entitled the *Nuptials of Peleus and Thetis*—and the weird, imaginative poem *Attis*, in strange Galliambic verse. This composition has no parallel in Roman literature and its spirit shows a subtle Oriental influence. Catullus was a master of poetic diction, and the most original of the Roman poets if we except Lucretius. His shorter verse, however, is often marred by gross sensuality and even frank obscenity. He died at an early age, about B.C. 54. We possess one hundred and sixteen of his poems.

The best editions of Catullus are those by Bährens (Leipzig, 1885) and R. Ellis (Oxford, 1878; with standard commentary, 1889): there is a very good pocket edition by Postgate (London, 1889). He has been often translated into English—by Lamb (1821), Martin (1861), Cranstoun (1867), Ellis (1871), Hart Davies (1879), and Grant Allen (the *Attis* only, 1892). Consult Sellar, *Roman Poets of the Republic* (Edinburgh, 1863; 2d ed. 1881).

CAT'ULUS. The name of several distinguished Romans. (1) Gaius Lutatius Catulus, the admiral whose fleet defeated the Carthaginians near the Ægates Insulæ, off the Sicilian coast, in B.C. 241, thus closing the First Punic War. (2) Quintus Lutatius Catulus, consul with Marius in B.C. 102, when he was unsuccessful in repressing the advance of the Cimbri to the Po. In the following year, with Marius, he fought them in a great battle on the Raudian Fields, where the whole tribe was annihilated (July, B.C. 101). (See Cimbri.) In the proscription of Sulla (B.C. 87) his name was included: but he preferred suicide, and suffocated himself with charcoal fumes. (3) Quintus Lutatius Catulus, son of the preceding, consul in B.C. 78 and censor in 65. He quelled the revolutionary uprising of Lepidus, his colleague in the consulship, and assisted Cicero in the prosecution of Catiline.

CAUCA, kou'kȧ. A river of Colombia, South America, the chief tributary of the Magdalena (Map: Colombia, B 2). It rises in the southern portion of the Central Cordillera, and flows in a northerly direction between the Western and the Central Cordilleras, forming numerous waterfalls, but becoming navigable at Antioquia. It joins the Magdalena north of Mompos, about 150 miles from the sea, after a course of nearly 700 miles.

CAUCA. The largest department of Colombia, embracing the west coast of the Republic, the three chains of the Andes, and the valley of the Rio Cauca, as well as a large part of the interior (Map: Colombia, B 3). Its area, including the disputed portion, is about 257,462 square miles, or about one-half of the area of the entire Republic. It is divided by the Andes into two parts, of which the western is alone developed. The territory of Caquetá, which occupies by far the larger portion of the department, belongs to the basin of the Amazon, and is almost uninhabited. The formation of the surface and the climatic conditions of Cauca present an extraordinary variety, ranging from the lofty, snow-clad peaks of the Andes to the fertile valleys along the rivers. The centre of population and cultivation is along the Cauca Valley, where corn, sugar-cane, cacao, tobacco, etc., are grown with success. The mineral wealth, especially gold and silver, is extensive. The forests which cover a large section of the department yield large quantities of rubber and cinchona. The population (mostly mixed) is estimated at 700,000, including the aborigines. The capital is Popayán.

CAUCASIA, kạ-kā'shĭ-ȧ. See Caucasus.

CAUCASIAN, kạ-kā'sh*a*n, or **CAUCASIC,** kạ-kā'sĭk, **RACE,** The. The name applied by Blumenbach (1795) to the white division of mankind, as distinguished from the yellow, the brown, and the black. Whether these divisions be called species, subspecies, varieties, or races, they exist and have separate names. The objection is made to the word that it is not sufficiently connotive, because the peoples of the Caucasus do not fairly represent the grandest division of humanity. But the term is fixed in literature, and will doubtless remain. Another controversy is waged over the original area of development and dispersion of the Caucasian race. Within a quarter of a century opinions have shifted from southern Asia to northern Africa. Keane says that the Caucasic progenitor originated in Africa, north of the Sudan, and quotes Sergi as saying that Africa is the cradle land whence this Caucasic family spread northward to Europe, where it still persists, and eastward to western Asia. The whole of northern Africa, connected by land with Europe in the Quaternary epoch, formed part of the geographical area of the ancient white race. The last word has not been said on this point. The cradle land of the human species may have been in southeastern Asia. In that event, new difficulties with reference to the formation of the great subspecies arise.

Various classifications of the members of the Caucasic race have been made. Huxley (1870) made two separate races of whites—the Xanthochroid of northern Europe, and the Melanochroid of southern Europe, northern Africa, and Asia. A much later tabulation is that of Deniker, here given:

I. Brunette Type: Wavy Brown or Black Hair, Dark Eyes.

Clear brown skin, black hair, narrow, straight or convex nose, tall stature, dolichocephalic.			Indo-Afghan.
Tawny white skin, black hair	Tall stature, long face.	Aquiline nose, prominent occiput, elliptical face, dolichocephalic.	Arab or Semite.
		Straight coarse nose, square face, dolichocephalic	Berber (4 sub-races).
		Straight fine nose, oval face, mesocephalic	Littoral European.
	Short stature, dolichocephalic		Ibero-Insular.
Dull white skin, brown hair	Short stature, round face, strongly brachycephalic		Western European.
	Tall stature, elongated face, brachycephalic		Adriatic.

II. Fair Type: Wavy or Straight Hair, Light Eyes.

Reddish white skin	Hair somewhat wavy, reddish; tall stature, dolichocephalic	Northern European.
	Hair somewhat straight, flaxen; short stature, sub-brachycephalic	Eastern European.

In this table the Littoral European (called also Atlanto-Mediterranean) corresponds with the Iberian of English writers; the Western European, or Cévenole, is the Celtic, or Alpine, of authors; the Adriatic type is the tall, brachycephalic population of the northwest Balkan Peninsula; Northern European corresponds with Teutonic, or Nordic, and Eastern European with White Russian, or Lithuanian.

Compare this scheme with Keane's divisions of the Caucasic peoples: (1) *Homo europæus.*—Scandinavians, North Germans, Dutch Flemings, most English, Scotch, and Irish; Thrako-Hellenes, some Kurds, most West Persians, Afghans, Dards, and Siah-posh Kafirs; many Hindus. (2) *Homo alpinus.*—Most French and Welsh, South Germans, Swiss, and Tyrolese; Russians, Poles, Czechs, Yugo-Slavs; some Albanians and Rumanians; Armenians, many Kurds, Tajiks (East Persians), Galchas, Indonesians. (3) *Homo mediterranensis.*—Most Iberians, Corsicans, Sards, Sicilians, Italians, Greeks, Berbers, and other Hamites; Arabs and other Semites; some Hindus; Dravidas, Todas, Ainus.

The best modern works on the subject are: Keane, *Ethnology* (Cambridge, 1896); id., *Man: Past and Present* (Cambridge, 1899); Ripley, *Races of Europe* (New York, 1899); Deniker, *Races of Man* (London, 1900); Sergi, *Mediterranean Race* (London, 1901).

CAUCASUS, ka̤'ka-sŭs (Lat., from Gk. *Καύκασος*, *Kaukasos*, Fr. *Caucase*, Ger. *Kaukasus*, Russ. *Kavkas*). A region occupying the southeast corner of Europe, and extending into Asia (Map: Russia, F 6). It extends from about latitude 38° to 46° 30′ N., constituting the isthmus separating the Caspian from the Black Sea and the Sea of Azov. Its area is about 180,000 square miles. Russian Armenia is included in the southern part.

Considered ethnologically and physically, the Caucasus is the most interesting part of the Russian Empire and one of the most interesting countries. The surface presents a wide diversity of aspects, since it comprises a low and marshy region in the north, as well as the snow-clad peaks of the Caucasus range. This range crosses the territory from northwest to southeast, and, with its offshoots, occupies the larger part.

The main range divides the country into Northern Caucasia (Ciscaucasia) and Transcaucasia. The former is, in the main, a level country, having lagoons, marshes, and steppes. Its central elevation lies between the headstreams of the Kuma and the Terek, which flow into the Caspian, and those of the Kuban, an affluent of the Black Sea. Transcaucasia, or the region south of the main Caucasus range, forms a striking contrast to the northern part. It is occupied chiefly by lines of mountains running parallel with the great central range. The river Kur, together with its affluent, the Aras, drains a great part of Transcaucasia, emptying into the Caspian. The much smaller Rion flows into the Black Sea.

The water system of the Caucasus belongs wholly to these two seas. Lakes are found only in Transcaucasia. The chief of them is the Gokcha, or Sevanga, situated in Erivan. Its altitude is above 6000 feet, its area over 500 square miles. For further physiographical details, see Caucasus Mountains.

The varieties of climate effect sharp contrasts in flora and fauna. From the northern pine on the lofty altitudes to the unusually luxuriant growths in the basin of the Rion, where figs, pomegranates, etc., flourish, there is an extraordinary range of vegetation. The fauna ranges from the leopard, and even the tiger, to the common European species of wild animals.

The mineral deposits of the Caucasus are regarded among the richest in Russia, and its oil-wells are second only to those of the United States. There are produced annually nearly 10,000,000 tons of petroleum, over 600,000 tons of manganese ore, nearly 3000 tons of copper, besides sulphur, cobalt, salt, and iron.

Owing to its mountainous surface, only about 15 per cent. of the area of the Caucasus grows grain, conspicuously wheat. That portion is in the north, and produces nearly one-fifth as much wheat as European Russia proper. It also produces a large amount of hay—over one-tenth as much as the product of European Russia proper. The cultivation of the vine claims the chief attention of the soil-tillers in Transcaucasia, where much tobacco is also raised, besides some tea and cotton. The Caucasus is a very favorable region for live-stock growing. This industry is chiefly carried on by nomadic tribes, whose herds are often extensive. The native horses are held in high repute all over Europe for their speed and endurance.

The manufacturing industries of the Caucasus are but poorly developed. The natives make rugs and long woolen cloaks, also harness, which is usually richly and tastefully trimmed with silver. The rugs, as well as the silver and gold articles and weapons, show no little skill and artistic sense, and are exported to some extent. In the manufacture of wine, primitive methods are mostly used, and the product is hardly known outside of Russia.

The transportation facilities of the Caucasus, although considerably improved since the completion of the Transcaucasian railway, are yet far from adequate. In many parts the pack-horse is still alone used for transporting freight. The northern of the two railways connects the Caspian port Petrovsk with Novorossiisk, on the

Black Sea, and with Taganrog on the Sea of Azov. The southern line connects Baku, on the Caspian, with Poti, on the Black Sea. The exports of petroleum and grain from the Caucasus to western Europe across the Black Sea have of late become very important. The petroleum flotilla on the Caspian numbers over 300 vessels.

Administratively the Caucasus forms one of the general governments of the Russian Empire, and is divided into three governments and provinces in Northern Caucasia (Stavropol, Kuban, and Terek) and eight in Transcaucasia (Baku, Black Sea, Daghestan, Yelizavetpol, Erivan, Kars, Kutais, and Tiflis with Zakataly).

The population of the Caucasus in 1897 was 9,248,695, or 54 per square mile. In 1891 the population was only 7,955,725. The inhabitants are, in addition to the Caucasian Mountain peoples, mostly Russians, Armenians, Tatars, and Georgians. The chief cities are Tiflis (q.v.), the government capital, and Baku, now famous for its petroleum industries. The major part of the population acknowledge the Orthodox Church, but the Mohammedans are numerous. There are about 2000 schools in the Caucasus.

Keane (*Man: Past and Present*, 1899) divides the inhabitants of the Caucasus, on linguistic grounds, into four groups: (1) *Southern*—Georgians, Imeritians, Chevsurs, Lazes, Mingrelians, Pshavs, Swanittians, collectively called the Kartvelian family. (2) *Western*—Abkhasians, Circassians, and Kabardians. (3) *Central*—Ossetes, or Irons. (4) *Eastern*—Avars, Chechinzes, Daigs, Ingush, Kazy-Kumyksh, Kist, Lesghians, Tush, collectively called Daghestani, 'highlanders.' Nowhere else in the world, according to Ripley (*Races of Europe*, 1899), is such a heterogeneous confusion of peoples, languages, and religions gathered in one area. The number of dialects is rated at 68, representing all stages of development. The Ossete is put down as Aryan; the Circassian, including Abkhasian and Kabardian, is incorporative; some are purely agglutinative; and to these must be added later intrusions of Semitic and Aryan speech. Into the closed valleys of the Caucasian Mountains, during the migrations of peoples, came representatives of all tongues and nations, sufficiently isolated within their confined environments to preserve both physical and linguistic traits or to develop new ones.

Little is known of the early history of the Caucasus. The ancient Greeks perhaps carried on commercial relations with the tribes along the western coast, and Cape Iskuria may have received its name from the colony of Dioscurias, established in the Seventh Century B.C. As shown in the writings of Æschylus and Herodotus, the Greeks knew the location of the Caucasus range. It was not till about 1770 that the Russians began to enter the region. Kuban and Terek became theirs in 1774, and Derbent, Kuba, and Baku in 1796; so that by the end of the century Russia had acquired practically all of Northern Caucasia. The annexation of Georgia in 1801, after the death of George XIII., gave Russia a foothold in Transcaucasia. By cessions secured from Persia and Turkey, as well as by voluntary submissions on the part of the more peacefully inclined native tribes, Russia had obtained, by 1829, nominal control over nearly the entire country.

The courageous mountain tribes, however, aided by the general inaccessibility of the region, retained their independence, and it was only after thirty years of continuous fighting that their subjugation was accomplished. Shamyl was the chief leader of the natives in whom religious zeal was combined with marvelous bravery. He gave to the resistance of the Caucasians a more organized character, defeating the Russian conquest. At last Shamyl was forced to surrender at Ghunib in 1859, and Russian dominion was virtually assured. The operations in the west ended in complete success at last in 1865. A great exodus of Circassians to Turkish territory ensued. During the Russo-Turkish War in 1877-78, there was an uprising against Russian control, and the Turks lent active assistance, but the attempt proved wholly futile. Russia's success in this war secured to her a large section of Turkish Armenia, which was annexed to the Caucasus.

Consult: Keane, *Man: Past and Present* (New York, 1899); Ripley, *Races of Europe* (New York, 1899); Bodenstedt, *Die Völker des Kaukasus* (Berlin, 1855); Fischer, *Zwei Kaukasus-Expeditionen* (Bern, 1891); Erckert, *Der Kaukasus und seine Völker* (Leipzig, 1887).

CAUCASUS MOUNTAINS. A mountain range on the Caucasian Isthmus, forming part of the boundary between Europe and Asia. It extends in a west-northwest direction from the peninsula of Apsheron, in the Caspian Sea, to the peninsula of Taman, between the Black Sea and the Sea of Azov, being separated here from the mountains of the Crimea by the narrow Strait of Kertch. The range is about 750 miles in length and from 60 to 125 miles in width. The narrowest section is almost in the middle of the isthmus, where the basin of the Terek River occupies a depression that leads into the Dariel Pass. While formed by several chains running parallel, or diverging and again uniting in mountain knots, the range is remarkable for its geographical and geological unity. West of the Dariel Pass there is an almost unbroken line of mountains exceeding the Alps in elevation, which forms a veritable barrier between the regions to the north and south. Eastward the Caucasus is lower, more broken, and is cut by numerous transversal valleys. The southern slopes of the mountains are generally much sharper than the northern, which fall by gradual stages to the level of the Terek and Kuban valleys. The range includes many massive peaks of great altitude. Elbruz (18,470 feet), Koshtantau (16,900), Dikhtau (17,000), Kasbek (16,546), and other peaks overtop Mont Blanc. Elbruz and Kasbek are probably of volcanic origin. The loftier mountains carry fields of snow and ice, but the glaciers are not so extensive as in the Alps, where they have greater breadth and a lower snow-line. Most of the central ranges are composed of granite and crystalline schists. On the northern slopes Jurassic and Cretaceous sediments predominate, and are continued into the Caucasian steppes, where they dip below the Tertiary and Quaternary formations. The Kuban and Rion rivers drain the western Caucasus into the Black Sea, while the eastern region is drained by the Terek and Kur into the Caspian. There are but few practicable routes across the range, the most important being from Vladikavkaz, on the northern side, through the Dariel Pass to Tiflis, which is used as a commercial and military highway.

Little Caucasus. To the south of the valleys of the Kur and Rion, in Transcaucasia, there are several mountain groups forming a broken chain that extends from near Poti on the Black Sea southeast to the Persian frontier. These groups are collectively known as the 'Little Caucasus,' or as the 'Mountains of Transcaucasia.' The highest point is Alaghez, over 13,000 feet.

CAUCHON, kō'shōN', Joseph Edward (1816-85). A Canadian journalist and statesman. In 1842 he established *Le Journal de Quebec*, and conducted it until his death. He entered the Provincial Parliament in 1844, and served in it and in the Dominion Parliament after the formation of the confederation until 1877. During 1867-72 he was Speaker of the Senate. He held Cabinet offices in the Provincial and Dominion Governments, and was Lieutenant-Governor of Manitoba from 1877 to 1882. Among other works, he published *L'Union des provinces de l'Amérique Britannique du Nord* (1865).

CAUCHY, kō'shē', Augustin Louis (1789-1857). A French mathematician. He was born in Paris, and was educated at the Ecole Polytechnique. In 1810 he went to Cherbourg, in the capacity of an engineer, but his health failing, he returned to Paris in 1813, renounced engineering, and chose pure science for his life work. His *Mémoire sur la théorie des ondes* was crowned by the Institute in 1815, and in 1816 he became a member of the Academy of Sciences. Later he became professor at the Polytechnic School. In 1830 he refused to take the oath required by Louis Philippe, and went into voluntary exile. During his stay abroad he held for a short time the chair of mathematics in Turin, and later (1834) went to Prague as tutor of the Comte de Chambord. He returned to France in 1837, but his political views were such as to bar him from the higher professorships until the advent of the Government of 1848. In that year Cauchy was made professor of mathematical astronomy at the Sorbonne, a chair which he held, with a brief interruption, until his death. In politics Cauchy was a Legitimist. He was known as a man of piety and was a defender of the Jesuits.

The works of Cauchy occupy a leading place in science. All parts of pure and applied mathematics, as geometry, algebra, the theory of numbers, integral calculus, mechanics, astronomy, and mathematical physics, are indebted to his discoveries. He verified the periodicity of elliptic functions, gave the first impetus to the general theory of functions, contributed to determinants (q.v.), and laid the foundation for the modern treatment of the convergence of infinite series (q.v.). He emphasized the imaginary as a fundamental, not subsidiary, quantity, perfected the method of integration of linear differential equations (see Calculus), advanced the theory of substitutions, invented the calculus of residues, and, in general, was one of the leaders of the Nineteenth Century in infusing vigor into analysis. The propagation of light and the theory of elasticity also received his attention.

Consult: Valson, *La Vie et les travaux de Cauchy* (Paris, 1868); Terquem, "Analyse des travaux de Cauchy," in the *Nouvelles annales de mathématiques* (Paris, 1857). *Les œuvres complètes d'Augustin Cauchy* (Paris, 1882-1901) were published under the direction of the Academy of Sciences.

CAUCUS (of uncertain origin; possibly from Med. Lat. *caucus*, Gk. καῦκος, *kaukos*, cup, as being originally an informal festal gathering). A term applied (1) to an informal meeting of the voters of a political party within a limited district for the purpose of nominating candidates for office or of naming delegates to a nominating convention, and (2) to a conference of the members of a political party in a legislative body for the purpose of determining in detail the course to be pursued by the members of the body belonging to such party. In its former application the word is said to have been derived from the "Caulkers' Club," a political organization of some prominence in Boston during the activity of Samuel Adams (q.v.). Until within a comparatively brief period this informal meeting of voters was a well recognized and widely established feature of the American political system. In the party caucus all 'regular' members of the party were considered entitled to be present and to be heard. Its participants named the party's candidates for local office and determined the policy of the party in the political district from which the members of the caucus were drawn. From the caucus of a small political unit, such as the town or the Assembly district, were sent the various constituent members of a larger and similar conference representing, and acting for, the voters of a Congressional district or of an entire State. Within the past two decades the typical caucus of the past has assumed a new form through the statutory control of nominations to office, especially in the establishment of a system of so-called "primaries," the composition and procedure of which have in several States been made the object of as detailed and specific legislative control as are the elections themselves. The informalities which earlier made possible many questionable practices in the effort to 'capture' a caucus have thus gradually disappeared, and have been superseded by the routine of secret balloting by the legally registered members of a party. The nominating caucus appeared also in American politics in a conspicuous form, until 1824, in the caucus of members of Congress of each party which for a couple of decades named the candidates for the Presidency and Vice-Presidency, until the system of national nominating conventions was introduced.

The second type of caucus has not only survived, but has increased in influence and has become recognized as a legitimate feature of legislative procedure. Both in local legislative bodies and also in the various State legislatures, and still more conspicuously in Congress, the members of each party participate in a caucus, by which are named the party's candidates for the offices of the body and by which are determined the lines of policy to be followed within the larger body. Such action is considered as binding not only upon all the participants in the caucus, but also upon all members of the Legislature belonging to the party holding the caucus; and very rarely do any dissentient members of a party have the will, or the desire, to 'bolt' the action of their caucus.

CAU'DA-GAL'LI GRIT. See DEVONIAN SYSTEM.

CAUDEBEC-LES-ELBEUF, kōd'bĕk' lā-zăl'bēf'. A town in the Department of Seine-Inférieure, France, on the left bank of the Seine, opposite the town of Elbeuf and 12 miles south of Rouen. It has woolen-mills, cloth-factories, and dye-works. Population, in 1901, of town, 9681; of commune, 9751.

CAU'DINE FORKS (Lat. *Furculæ Caudinæ*). Two high, narrow, and wooded mountain gorges near the town of Caudium, in ancient Samnium, on the boundary toward Campania. These gorges are celebrated on account of the defeat here suffered by the Romans in the Second Samnite War (B.C. 321). Four Roman legions commanded by the two consuls, Titus Veturius and Spurius Postumius, after marching through a narrow pass found themselves locked in a spacious valley, surrounded on all sides by lofty mountains, with no way out save that by which they entered, and another pass on the opposite side. Attempting to defile through the latter, they found it blocked up with trees and stones, and commanded by the Samnites, who had also in the meantime made themselves masters of the other pass. Consequently, the four legions were compelled to encamp in the valley. After some days, famine compelled them to surrender unconditionally. The Samnite general, Gaius Pontius, according to old custom, compelled the Romans to pass under the yoke, and then permitted them to march back. This submission was regarded as too ignominious for Rome, and consequently the two consuls and the other commanders were delivered again into the hands of the Samnites, who, however, refused to have them.

CAU'DLE'S CURTAIN LECTURES, MRS. A series of farcical papers contributed by Douglas Jerrold to the London *Punch* and published in 1846. They also form volume third of the author's *Collected Works*, London, 1852. They consist of a series of marital monologues delivered after retiring by a woman of decided views to her meek and sleepy husband.

CAUER, kou'ĕr, EMIL (1800-67). A German sculptor, born in Dresden. He studied under Rauch in Berlin and under Haller in Munich. In 1829 he restored the valuable antiques in the museum in Dresden, and in 1832 he was appointed drawing-master at the gymnasium of Kreuznach. Here he designed his principal works, "Sickingen," "Hutten," "Charles V.," "Melanchthon," as well as the fairy-tale representations "Cinderella" and "Little Red Riding Hood," of which thousands of copies were afterwards made.

CAUER, KARL (1828-85). A German sculptor, son of the preceding. He was born in Bonn, and studied with his father, and afterwards with A. Wolff in Berlin. He is the discoverer of the so-called 'ivory mass,' used in the reproduction of statuary. He designed the tomb of President Garfield, and executed a great number of statues. Among these are: "An Olympian Victor" (1856), acquired by Emperor William I.; "The Witch" (1874, National Gallery, Berlin); and "Brunnhild" (1877).

CAUGHNAWÁGA, kạ'nȧ-wä'gȧ (Mohawk, at the rapids), or SAULT SAINT LOUIS. A village in Laprairie County, Quebec, Canada, 10 miles west of Montreal, on the Saint Lawrence, at the head of the Lachine Rapids (Map: Quebec, C 5). It is inhabited exclusively by Catholic Indians, remnants of the once powerful Iroquois, and is the largest Indian settlement north of Mexico. The old French town walls, built in 1721, are almost intact on three sides around the church; the presbytery, dating from 1725, contains the remains of the Mohawk saint, Tehgahkwita, and the room and desk of Père Charlevoix, the historian.

The village was established in 1676 under Jesuit direction by converts drawn from the Iroquois confederacy, chiefly Mohawks and Oneidas, and probably took its name from the ancient capital of the Mohawk tribe. The Caughnawága Indians, famous as boatmen and lacrosse-players, are also enterprising travelers and traders, and in families and small parties journey even to the Pacific Ocean. Population, in 1901, 2,110.

CAUK, or **CAWK** (provincial variant of *chalk*). The massive variety of the mineral barite, so called originally by miners in the Derbyshire lead-mines. See BARIUM.

CAUL (OF. *cale*, a sort of cap, Ir. *calla*, O. Gael. *call*, veil, hood; ultimately connected with Lat. *celare*, to hide, Skt. *śarana*, refuge). A thin membrane encompassing the heads of some children when born. It is merely the amniotic membrane (see EMBRYOLOGY: AMNION), which envelops every child before birth and which, on account of unusual strength, or for other reasons, has escaped rupture during the act of delivery. Extraordinary superstitions have been connected with it from very early ages down to the present day. (See SUPERSTITION.) It was a popular belief that children so born would be very fortunate, and that the caul brought fortune to those purchasing it. This superstition was so common in the primitive Church that Saint Chrysostom felt it his duty to inveigh against it in many of his homilies. In later times midwives sold the caul to advocates at enormous prices, "as an especial means of making them eloquent," and to seamen as an infallible preservative against drowning. It was also supposed that the health of the person born with it could be told by the caul which, if firm and crisp, betokened health, but if relaxed and flaccid, sickness or death. During the Eighteenth Century it was common to find advertisements in the newspapers of cauls to be sold. Similar advertisements appeared from time to time also during the Nineteenth Century. Consult: Brand, *Popular Antiquities* (London, 1870); *Notes and Queries*, Vol. VII. (London, 1849, et seq.).

CAULAINCOURT, kō'lăN'kōōr', ARMAND AUGUSTIN LOUIS DE, Duke of Vicenza (1773-1827). A statesman of the first French Empire, born at Caulaincourt, in the Department of the Aisne, December 9, 1772. He entered the army at the age of 15, rapidly attained promotion, and as colonel of a regiment of carbineers distinguished himself in the campaign of 1800. He was made a general of division in 1805, and in 1808 was created Duke of Vicenza. In 1807 he was appointed ambassador to Saint Petersburg, where he soon gained the confidence of the Czar, Alexander I. In 1811, on the eve of the outbreak of hostilities between Russia and France, he resigned his post, as he disapproved of

Napoleon's policy. He opposed the invasion of Russia. After the burning of Moscow, Napoleon selected him as his companion in his flight to France. In 1813 he was plenipotentiary to the allied sovereigns during the campaign of Saxony, and as Minister of Foreign Affairs attended the congress at Châtillon, February, 1814. After the abdication of Napoleon, Caulaincourt endeavored to make use of his influence with Alexander to obtain the most favorable conditions for the fallen Emperor, and chiefly through his intervention the island of Elba was given to Napoleon. During the Hundred Days Caulaincourt resumed office as Minister of Foreign Affairs, and was made a peer. On the Second Restoration, he retired to private life. He died in Paris, February 19, 1827. Consult Eileraux, *Souvenirs du duc de Vicence* (Paris, 1837-40). His brother, AUGUST JEAN GABRIEL, Comte de Caulaincourt, born 1777, served with distinction in all the campaigns from 1792 to 1812, when he fell in battle.

CAU′LIFLO′RY (from Lat. *caulis*, Gk. *καυλός*, *kaulos*, stalk + *flos*, flower). The production of flowers from the old wood, as in the redbud (*Cercis*). This habit is very characteristic of tropical forests, in which case possibly the thin bark explains its common occurrence.

CAULIFLOWER (Lat. *caulis*, stalk, especially of the cabbage, Gk. *καυλός*, *kaulos*, stalk + *flower*, from Lat. *flos*, flower), *Brassica oleracea* or *botrytis*. A form of cabbage in which the inflorescence, modified into a flattened head or compact mass, is the edible part. It is a less strongly flavored and more delicate vegetable than cabbage, and is eaten boiled with sauce or pickled. Its culture is similar to that of cabbage (q.v.), but the plant is not so hardy and requires a richer and more moist soil. When the head begins to form the outer leaves of the plant are drawn up over it and fastened. This produces a whiter and more marketable head. (For illustration, see CABBAGE.) Cauliflower-seed, formerly produced almost entirely in Europe, is now grown in commercial quantities in the vicinity of Puget Sound, Washington. There are a number of varieties of cauliflower, but without marked differences between them. Early Dwarf Erfurt and Snowball are among the best. Broccoli is simply a late maturing and more hardy form of cauliflower.

CAULO′NIA (Lat., from Gk. *Καυλωνία*, *Kaulōnia*). An ancient Achæan city in Italy, near the Gulf of Syllacium. It was a town of importance five centuries before Christ. In B.C. 389 it was destroyed by Dionysius the Elder, and though mentioned later, never attained any prominence. It is said that Pythagoras sought refuge in Caulonia after his expulsion from Croton.

CAULOP′TERIS (Neo-Lat., from Gk. *καυλός*, *kaulos*, stalk + *πτερίς*, *pteris*, fern, from *πτερόν*, *pteron*, wing, from *πέτεσθαι*, *petesthai*, to fly). A genus of fossil tree-ferns usually recognized by their trunks and found in rocks of upper Paleozoic and lower Mesozoic age of many parts of the world. The name was first given by Lindley and Hutton to erect trunks found in the Carboniferous rocks. More recently the genus has been found also in the lower Devonian of America and in the Permian and Trias of the Old World. The trunks show the places of attachment of the leaves, marked by scars, and these scars are arranged spirally about the axis. The various species are recognized by the form and size of the scars, which are generally large and of a circular or oval outline with an inner mark shaped like a horseshoe. Some of the finest examples found in America were obtained from the corniferous limestones of the lower Devonian of Ohio. These were described by Newberry, who considered that they grew upon an island which occupied the vicinity of Cincinnati during a time when the remainder of Ohio and the Mississippi Valley was covered by a shallow arm of the ocean. The leaves known as Pecopteris, so common in the coal measures of the Appalachian region, are thought to be the foliage of Caulopteris.

CAUMONT, kō′mōN′, ARCISSE DE (1810-73). A French archæologist, born in Bayeux (Calvados). He is known as the founder of the Société Française d'Archéologie pour la Conservation des Monuments Nationaux, and thus of the systematic study of French archæology. The investigation of national antiquities he greatly furthered by such works as the *Statistique monumentale du Calvados* (5 vols., 1846-47).

CAURA, kou′rä. A river of South America, a tributary of the Orinoco, which rises in the southern part of Venezuela on the northern slopes of the Sierra Pacaraima, in a number of headstreams, chief of which is the Merevari, and flows generally north-northwest through the Department of Bolivar (Map: Venezuela, E 2). It joins the Orinoco in about longitude 66° W. and, including the Merevari, it is over 400 miles long.

CAUS, kō, or **CAULX**, SALOMON DE (1576-1626). A French engineer and physicist who resided in England and in Heidelberg, and later in Paris. Little was known of him until Arago exhumed his works, from a study of which he reached the conclusion that he was the real inventor of the steam-engine, for in one of these works he gave the plan of an apparatus for raising water by the power of steam.

CAUSALITY (Fr. *causalité*, from Lat. *causalis*, causal, from *causa*, cause). The relation in which cause stands to effect and effect to cause. Causation is the relation of cause to effect.

Of cause, causation, and causality, many views have been held. Aristotle was the first to devote much attention to the nature of causality, whereas many of his predecessors had spent much time on trying to discover particular causes for particular effects or some one general cause for the universe as a whole. But even Aristotle's contribution to the subject consisted rather in classification of various kinds of causality than in any satisfactory discussion of the ultimate nature of the relation between cause and effect. He enumerated four different kinds of causes, which have ever since had a place in philosophy. These are the material, the formal, the efficient, and the final. The first, or material, cause is what anything is made of, e.g. brass or marble is the material cause of a given statue. The formal cause is the form, type, or pattern, according to which anything is made; e.g. the style of architecture would be the formal cause of a house. Again, the efficient cause is the power acting to produce the work, e.g. the manual energy of the workmen. The final cause is the end or motive for the sake of which the work is produced, e.g. the pleasure of the owner. Aristotle mentions the case of a physician curing himself, as exemplifying all the causes in one and the same subject. Important as this classification has proved itself to be in the subsequent development of thought on the subject, it does not touch upon the problem of causality as it presents itself to the modern mind. This was due to the *naïveté* that in so many ways characterized the Greek thinkers. He *assumes* that there are causes and that they *produce* effects; but he does not help us to conceive the nature of the power—if power there be —exercised by the cause in the production of the effect. Sextus Empiricus, probably following Ænesidemus, raised some of the problems that have ever since busied the thoughts of philosophers. First of all he pointed out the relativity of the notion of cause, since cause has no meaning apart from effect. But, he argued, the relation has no real existence, but is merely a thought-product. We *think* causality into things which are themselves free from any such relation. Furthermore, there is a difficulty about the temporal relation of cause and effect. Cause cannot be prior to the effect, for it is not cause till the effect arises. It cannot be simultaneous with, nor subsequent to, the effect, for in either case it would not be what we mean by cause. This is evidently a sophism to be discussed further on; but it is a subtle one that has puzzled many thinkers even to the present day, and has conduced much to a clearer understanding of the time relation involved in causality.

In early modern philosophy there were two rival notions of cause. Descartes and his school made cause identical with substance, while the physical scientists reduced cause to a motion or change followed by other motion or change with a mathematical equality between measures of motion. But it was Hume who first in modern times took up the problem of causality where the skeptics had laid it down. He carried out to its logical conclusion the contention of Sextus Empiricus that causality is not a real relation, but a fiction of the mind, and he used the doctrine of association to account for the origin of the fiction. Any tie binding cause and effect, he pointed out, is undiscoverable by the senses; and as ideas are merely copies of sense-impressions, we have no idea of casuality. But we have a fiction of the imagination in regard to causality, and the fiction arises from the ease with which we pass from one perception to another perception, which in past experience has been constantly and unvaryingly associated with it. "We have no other notion of cause and effect, but that of certain objects, which have been always conjoined together, and which in all past instances have been found inseparable. We cannot penetrate into the reason of the conjunction. We only observe the thing itself, and always find that from the constant conjunction the objects acquire a union in the imagination." Hence "a cause is an object precedent and contiguous to another, and so united with it, that the idea of the one determines the mind to form the idea of the other, and the impression of the one to form a more lively idea of the other."

Hume's explanation of cause as a fiction which has no discoverable objective correlate led Kant to the position that the only knowable objective world is, so far as all the relations obtaining within it go, the product of mind's creative activity. Kant accepted Hume's skeptical result as far as it concerned itself with the world of things-in-themselves; but not being satisfied that experience is only a succession of perceptions without any discoverable coherence, he made causality one of the principles of coherence obtaining in the world of phenomena, and universally present there because always put there by thought as a part of its contribution to the nature of that world. (See KANT, and CATEGORY.) Thus both Hume and Kant agree in denying absolute objectivity to causality; they disagree in that the former denies also a relative objectivity to causality, while the latter asserts such objectivity. The difference is due to the fact that for Hume the ideal world (the bundle of perceptions) is comparatively unorganized and chaotic; for Kant it is so thoroughly organized that it is regarded as a universe with relative objectivity and the relations obtaining therein as thoroughly knowable, inasmuch as they are contributions by the knower. Hegel, denying outright a transcendent world beyond experience, and recognizing, as Kant did, the universal prevalence of causality within experience, made causality thoroughly objective. But the question arises, How is it known that causality is universal within the world of experience? We have not always experienced a cause for every experienced effect: in fact, the whole problem of physical science is to discover causes for known events. How do we know they have any causes at all? Kant, as we have already seen, answers: We know, because we have made our world in such a way that everything has a cause. Hegel's answer to this question cannot be given here, as it would require too minute a discussion. J. S. Mill took up the problem here; denying the fundamental postulate of Kant's transcendentalism, viz. that the order of this world is thought-made, he seeks to justify our belief in universal causation by tracing it back to an induction (q.v.) which rests upon a larger experience than any other induction can have. The difficulty with this view is that for Mill all induction rests upon the principle of causality, and it is a circular procedure to make causality rest on induction. But circularity is the last resort inevitable in all reasoning. (See KNOWLEDGE, THEORY OF; and LOGIC.) But the difference between valid logical circularity and vicious circularity is the difference between a systematic support given to each part of experience by all other parts, and an attempt to make two judgments support each other while neglecting the concrete experience upon which all judgments must rest. Mill's circularity in the present instance is fundamentally sound, but the form in which he presents his reasoning is inadequate, and hence has led to severe criticism. Perhaps it would answer all purposes concerned to say that the tendency to make induction from observed fact is natural to a thinker. But whether any particular induction is valid is another question, to be answered only by carefully studying all the inductions that have reached satisfactory results and finding what characteristics they have in common and wherein they differ from inductions admittedly erroneous. Such a study shows that satisfactory inductions, i.e. inductions upon which we have learned that we can rely, have in common the assumption of the principle of causality as obtaining within the sphere covered by the induction. This assumption, at first and for a long time, was not consciously made, but none the less we can now see that it was made. Gradually, in certain spheres, the principle of causality came to be clearly recognized as obtaining, but still not as supporting the inductions formerly made. As time went on, the prevalence of causality in still other and other spheres was ascertained. Then the natural tendency of thought to generalize caused men to make inductions to the universal prevalence of causality. Then when the question arose as to the foundation of induction, it was finally discovered that it rested upon an unrecognized assumption of causality, even in the case where the universal prevalence of causality was the subject matter of induction. Is this vicious? No, unless it can be shown that the assumption has led to results that are untenable. On the contrary, in this case the assumption lies at the foundation of every valuable structure raised by thought, and the tenability of the assumption is guaranteed by the validity of all that follows from the assumption and that would be invalidated were the assumption unjustifiable. See INDUCTION; KNOWLEDGE, THEORY OF.

Along with this account of the origin of knowledge of cause goes a definition of cause which is at the present day quite widely accepted. The cause of any event is a preceding event without which the event in question would not have occurred. Both causes and effects are always events; *not things*, but things *in action*. The complete cause would be all the indispensable previous events. But as all inquiry that is of any value is confined within limits, the question as to the cause of an event is not generally a demand for a complete inventory of indispensable previous events, but for some event which, in connection with other events taken for granted, is needed to account for the event under discussion. According to this view of cause neither the 'material cause' nor the 'formal cause' is a cause; and the 'final cause' is a cause only in the sense that the *idea* of the end to be obtained, together with all the affections belonging to it, may, as an event, be an indispensable temporal prerequisite to an action that terminates in the attainment of the end. A final cause is then not a future event as an event that in time will take place, but as one now anticipated. And the anticipation precedes the effect it produces.

This brings up again the question as to the temporal relation of cause and effect. Some philosophers of to-day, following Sextus Empiricus, maintain that cause cannot be anterior to effect. This, however, is a mistake resting upon a failure to appreciate the continuous character of time (q.v.). The cause exists before the effect, but continues itself into the effect. It is to some extent an arbitrary matter where the line be drawn that divides cause from effect; but drawn it must be somewhere if one is to be clear-headed in talking about causality, and when drawn all the part of the continuous cause-effect process that precedes the line is cause, and all the part that follows is effect. And the line itself does not exist as a *gap* between cause and effect, but simply as the line of *juncture* of cause and effect. See CONTINUITY, LAW OF.

This last statement brings us to the last point here to be made as to the nature of causality. After all that has been said the relation between cause and effect is still left unknown, *provided* one assumes that the indispensableness of cause to effect is the result of an unknown something in the nature of the cause and of the effect. But such an assumption is ungrounded, if by nature one means a mysterious constitution of qualities. A simple view which seems to satisfy all the conditions of the case, and to leave no insoluble mystery, is that the causal relations in which an event stands are part of the attributes of the event. We do not have two self-subsistent independent events, which are then in some incomprehensible way made to depend one on the other, as effect upon cause. Neither event is properly thought unless its discoverable causal relation to the other is thought of as being part of its nature as much as any other quality it may have. Thus we think of cause and effect not as magically conditioning each other, but as being different steps in a continuous process, within which each step is what it is by virtue of its relation to all other steps. Cause and effect are organically inter-related, and the organic whole within which they interact is the *ground* of their interaction. Consult: Bosanquet, *Logic*, Vol. I. (Oxford, 1888); Bradley, *Principles of Logic* (London, 1883); Hobhouse, *Theory of Knowledge* (London, 1896), consulting index for pertinent passages; Mill, *System of Logic*, Book III. (London, 1856); Hume, *Treatise of Human Nature*, Book I., Part III. (London, 1882); and id., *An Enquiry Concerning the Human Understanding* (Oxford, 1894); Kant, "Transcendental Logic," in *Critique of Pure Reason*, translated by Max Müller (London, 1881); and Kant's commentators, among whom may be mentioned Caird, *The Critical Philosophy of Immanuel Kant* (Glasgow, 1889), and Watson, *Kant and His English Critics* (Glasgow, 1881).

CAUSE CÉLEBRE, kôz sā'lĕb'r' (Fr., celebrated case). A term for any specially interesting or important legal case, criminal or civil. During the Seventeenth and Eighteenth centuries it was more particularly applied to the State trials in France. There is a French collection of *Causes célèbres et intéressantes*, by Gayot de Pitaval (20 vols., 1734-43), with later continuation, and Desessarts also contributed a valuable work (1785-87) to this branch of legal literature. Typical examples of modern cases to which the term is applied are that of Calas, who was broken on the wheel at Toulouse in 1762 on a baseless charge of having put his son to death to prevent him from becoming a Roman Catholic; the Tichborne trial, in which for years (1871-74) all England was interested, involving the identity of a claimant to title and estates; and the recent trial of Captain Dreyfus in France, which attracted the attention of the entire civilized world.

CAUSERIE, kôz'rē' (Fr., chat, from *causer*, to chat, gossip, from Lat. *causari*, to plead, from *causa*, cause, case). A term first used in a literary way by Sainte-Beuve in his famous *Causeries du Lundi*. It signifies a short, familiar paper on any subject, usually published in magazines or newspapers. As the writer is generally well known, its style is convenient where readers are interested in the author as well as in what he says. It is less formal than the generally accepted style of essay.

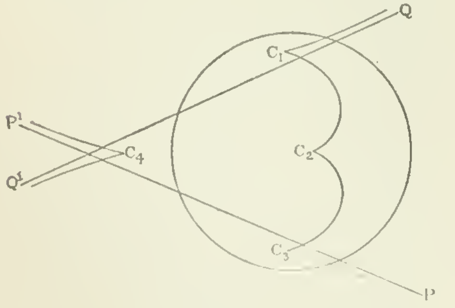
CAUSERIES DU LUNDI, du̦ lẽɴ'dē' (Monday Chats). The modest title of collections of critiques by Sainte-Beuve, beginning with 1851. They are distinguished by brilliancy and keen analysis, and are concerned not only with French authors, but also with prominent writers of other nations.

CAUSSES, kôs, Plateaux des. A name applied to a barren plateau region of cretaceous formation in south central France, lying chiefly in the departments of Lozère, Aveyron, Hérault, and Gard. It is crossed by mountains and ravines, resembling cañons, which add to its forbidding aspect, and is very sparsely inhabited.

CAUSSIN DE PERCEVAL, kō'sǎɴ' de pâr's'-vâl', Armand Pierre (1795-1871). A French Orientalist, born in Paris. He was appointed professor of the Arabic language and literature at the Collège de France, and in 1849 was elected to a seat in the French Academy. His *Essai sur l'histoire des Arabes avant l'Islamisme* (3 vols., 1847-49) is a noteworthy study, in which the author was greatly assisted by the large manuscript collection of the Imperial Library.

CAUSTIC (Lat. *causticus*, Gk. καυστικός, *kaustikos*, from καυστός, *kaustos*, burned, from καίειν, *kaiein*, to burn). A term used in medicine and chemistry in connection with substances that have a corroding or burning action on the skin and flesh. *Lunar caustic* is silver nitrate fused and cast into the form of small pointed sticks of the thickness of a lead-pencil. *Caustic potash* is, chemically, potassium hydroxide; *caustic soda* is sodium hydroxide; *caustic lime* is calcium hydroxide.

CAUSTIC. In mathematics, an envelope of rays radiating from a point and reflected or refracted by a given curve. One form of the caustic may be readily observed by letting sunlight fall on milk, in a glass or cup not quite filled with it. Caustics are distinguished as catacaustics (caustics by reflection) and diacaustics (caustics by refraction). The names 'catoptric caustics' and 'dioptric caustics' have also been applied to the two classes. The figure represents both branches of the catacaustic of a circle. The curve has four cusps C_1, C_2, C_3, C_4, and the lines PP^1, QQ^1, are asymptotes to its two branches. The cardioid (q.v.) is a catacaustic of a circle for luminous rays proceeding from a point on the circumference. Consult: Cayley, "Memoir on Caustics," *Phil. Trans.*, Vol. CXLVII. (London, 1857; 273-312. See also Vol. CLVII.). For further bibliography, consult the *Intermédiaire des mathématiciens* (Paris, 1894-95). See also Aberration, Spherical; and Light (section, *Geometrical Optics*).



CAUSTIC.

CAUTERETS, kô't'-râ' (formerly *Cauldres*, from its hot springs, Fr. *chaud*, Lat. *caldus*, *calidus*, hot, from *calere*, to be hot). A watering-place in the Department of Hautes-Pyrénées, France, 26 miles southwest of Tarbes (Map: France, F 9). It is in a basin 3254 feet above the sea and is visited yearly, between May and October, by about 20,000 people, for its twenty-four hot sulphur springs, which range from 102° to 104° F., and are the most abundant in the Pyrenees. There are nine establishments for drinking, inhaling, and taking plunge and douche baths. Population, in 1901, of town, 1132; of communes, 1547.

CAUTERY. See Bleeding.

CAUTIN, kou'tēn. A province of Chile, bounded by the Pacific on the west, Argentina on the east, and the Chilean provinces of Malleco and Valdivia on the north and south respectively (Map: Chile, C 11). It has mountains of considerable elevation in the western part, including the active volcano Llaimas, nearly 9800 feet. The chief river is the Cautin. The Cautin basin has a productive soil yielding grain and fruit in abundance. The chief export is wheat. The province has developed rapidly, many immigrants settling in that quarter. Its population increased during 1885-95 from 33.291 to 78,221. Capital, Temuco (q.v.), and chief port Tolten.

CAUTIO, kạ'shĭ-ō (from *cavere*, to safeguard, to assure). In Roman law *cautio* meant: (1) A formal undertaking to fulfill a legal obligation, especially an obligation imposed by the court upon a party to a suit. Such a judicial *cautio* was usually established in the form of stipulation, i.e. by question and answer (see Stipulation), with security in the form of an identical undertaking by a surety (*fidejussor*). Of such undertakings a memorandum was usually made in writing; and thus *cautio* came to mean: (2) a written acknowledgment that a promise had been made upon oral stipulation. By further extension, *cautio* came to mean: (3) a written acknowledgment in general, and in particular an acknowledgment of the receipt of money, whether as a loan or as payment of a debt.

Cautio damni infecti. Literally, assurance against damage not yet done. At Roman law, when land or a building was threatened with injury in consequence of the defective condition of a neighbor's land or building, the person whose interests were imperiled could demand from the neighbor an undertaking (*cautio*, in the sense first noted above) to make good any damages that might ensue. If the neighbor refused to give the *cautio*, the party imperiled was put in possession, and, in case of continued contumacy on the neighbor's part, was made owner of the neighboring premises. A similar *cautio* could be demanded when 'new work,' e.g. excavation or construction, had been begun; and if the *cautio* was refused, the work was arrested by injunction (*interdictum*).

CAUVERY, kạ'vẽr-ĭ.

CAVA, kä'vȧ. An episcopal city in south Italy, 2½ miles from the gulf, and 6 miles northwest of the city of Salerno. It is a resort for Neapolitans in summer and for foreigners in spring and autumn, being an attractive base for excursions to Pompeii, Pæstum, Amalfi, etc. A short distance southwest of the town is the famous La Trinità della Cava, a Benedictine abbey founded, in 1025, by Saint Alferius over the cavern he had occupied. It is now national property, and contains a lyceum and a boarding school. The present buildings date from the Eighteenth Century. The archives contain many important MSS. The principal manufactures of Cava de' Tirreni are linen, silk, and woolen fabrics. Population, in 1881 (commune), 21,600; in 1901, 23,681.

CAVAIGNAC, kȧ′vȧ′nyȧk′, Eléonore Louis Godefroy (1801-45). A French journalist and Republican politician, the son of Jean Baptiste Cavaignac. He was an opponent of Louis Philippe and was one of the prominent founders of the Société des Amis du Peuple, and of the Société des Droits de l'Homme. He was often arrested and occasionally imprisoned, but escaped in 1835 and went to England. In 1841 he returned to Paris and became one of the editors of *La Réforme*, the ablest of the opposition newspapers.

CAVAIGNAC, Jacques Marie Eugène Godefroy (1853—). A French politician. He was born in Paris, May 21, 1853, the son of General Cavaignac, the opponent of Louis Napoleon. In 1868, when young Cavaignac had won a prize in the Paris schools, which was to be bestowed by the Prince Imperial, he drew back, saying: "I do not care to be rewarded by a gentleman whose father put mine into prison." The youth fought bravely in the Franco-Prussian War, and in 1872 he became an engineer. Afterwards he studied law and followed this profession with success until 1882, when he entered the Chamber of Deputies from the district of Saint-Calais. Since then he has had a distinguished political career. He was under-secretary in the Department of War in 1885, Minister of Marine in 1892 and in 1895-96, and Minister of War in 1898, at a critical period of the Dreyfus affair. In 1890, on the occasion of the Panama disclosures, Cavaignac made his famous motion that "the Chamber is resolved to sustain the Government in the repression of all acts of corruption and to prevent the recurrence of like governmental practices." He is author of an economic treatise, *L'état et les tarifs des chemins de fer;* and of a work on Prussia, *La formation de la Prusse contemporaine* (2 vols., Paris, 1897-98).

CAVAIGNAC, Louis Eugène (1802-57). A French general. He was born in Paris, October 15, 1802, and was educated in the Polytechnic School, and the École d'Application in Metz. Entering the army, he rendered efficient service in Algeria, where he went in 1832, and rose rapidly in rank, becoming a brigadier-general in 1844, Governor of the Province of Oran in 1847, and Governor-General of Algeria in the following year. He was, however, almost immediately recalled to Paris after the February revolution, and in May was made Minister of War. Called upon to defend the republican Government during the June insurrection, he displayed energy, courage, and coolness. His operations were successful, and his clemency was as meritorious as his generalship. Though he might have made himself dictator, he resigned his power into the hands of the National Assembly, which appointed him chief of the executive body. As a candidate for the Presidency of the Republic in December, against Louis Napoleon, he received about 1,500,000 votes to the latter's 5,500,000. After the coup d'état of December 2, 1851, Cavaignac was arrested, but was released after a short detention; and though he consistently refused to give his adhesion to the Empire, he was permitted to reside in France without molestation. He died of heart disease, October 28, 1857, at his country house near Tours. De Tocqueville, in his *Memoirs*, referring to Cavaignac as a debater, speaks of "those short addresses which he sometimes delivered, in which his mind, which was naturally mediocre and confused, reached the level of his soul and approached the sublime. Under these circumstances he became, for the moment, the man of the most genuine eloquence that I have ever heard in assemblies. He left all the mere orators behind him." Consult: Montfort, *Biographie du général Cavaignac* (Paris, 1848); Deschamps, *Vie de Cavaignac* (Paris, 1870).

CAVAILLÉ-COLL, kȧ′vȧ′lyȧ′kôl′, Aristide (1811-99). A French organ-builder, born in Montpellier (Hérault). In 1834 he obtained the commission in open competition, for the organ in the Church of Saint Denis. He constructed many other important instruments for churches in France and Belgium, and introduced several excellent devices used in modern organ-building. His writings include a *Projet d'orgue monumental pour la basilique de Saint-Pierre de Rome* (1875). Consult Lefebvre, *Le grand orgue de l'église Saint Michel du Havre* (Havre, 1888), an account of a work executed by Cavaillé-Coll in 1887-89.

CAVAILLON, kȧ′vȧ′yôɴ′ (anciently, *Cabellio*). A town of France, in the Department of Vaucluse, situated 20½ miles by rail southeast of Avignon (Map: France, L 8). It is interesting chiefly for the remains of a triumphal arch of about the time of Constantine, and other relics of the Roman period found in the neighborhood. It has also a Romanesque cathedral dating from the Twelfth and Thirteenth centuries. Its chief products are candles, cloth, hats, and silk fabrics. Population, in 1901, of town, 5650; of commune, 9850.

CAVALCANTI, kä′vȧl-kän′tē, Guido (c.1250-1300). An early Florentine poet and intimate friend of Dante, in whose judgment (Purg. xi. 97) he bore off from Guinicelli the palm for lyric verse. His betrothal as a lad, and subsequent marriage to Beatrice, daughter of the Ghibelline leader, Farinata degli Uberti, seems to have been due to political considerations only, he having been one of the sons of nobility chosen to cement the hostile families by marriage. The love poems, which form the major part of his verse, are inspired by the less familiar charms of a certain Vanna mentioned by Dante, by a Mandetta of Toulouse, a Pinella of Bologna, and other equally unknown ladies. When the Guelph party became divided into the contending factions of Cercheschi and Donateschi, Guido, in common with the other Cavalcanti, espoused the cause of the former, and together with the other leaders suffered exile, Dante, who was then one of the *priori*, being forced to assent to the decree. The malarial climate of Sarzana, to which he was banished, so shattered his health that, though recalled soon after, he died in August of the same year. Of Cavalcanti's poems two excellent critical editions have recently appeared: one edited by Arnone (Florence, 1881), the other by Ercole (Leghorn, 1885). Consult also Bartoli, *Storia della letteratura italiana*, Vol. IV. (Florence, 1881).

CAVALCASELLE, kȧ-väl′kȧ-sĕl′lȧ, Giovanni Battista (1820-97). An Italian art-historian, born in Legnago, and educated at the Academy of Venice, and in Padua, Milan, and Munich. He joined the Revolution of 1848, and after the reverses of 1849 was compelled to go into exile in England. There he wrote with J. A. Crowe an important work on *The Early Flemish Painters* (1857, 2d ed. 1872). He also wrote with Crowe a five-volume *History of Painting in Italy* (1864-71), from which the life of Titian was detached for the fourth centenary of the artist, and published as *Tiziano, la sua vita ed i suoi tempi* (1877). He was subsequently inspector of the National Museum in Florence, and director-general of fine arts in Rome. His other publications include a volume on Raphael (1884).

CAVALIER, kăv′ȧ-lēr′ (OF. *cavalier*, Fr. *chevalier*, from It. *cavaliere*, Sp. *caballero*, Med. Lat. *cabellarius*, horseman, knight, from Lat. *caballus*, horse, from the Celtic or Welsh *caffyl*, horse, Gael. *capull*, mare). A horse-soldier. In English history, a name applied to the adherents of King Charles I. as opposed to 'Roundheads' (q.v.), or friends of the Parliament.

CAVALIER. In fortification, a defense-work constructed on the *terre-plein*, or level ground of a bastion. See Fortification.

CAVALIER, kȧ′vȧ′lyȧ′, Jean (c.1680-1740). The famous chief of the Camisards (q.v.). He was a native of Lower Languedoc, the son of a peasant, and was first a shepherd, and afterwards a baker. He was driven from home by the pitiless persecution of Protestants that followed upon the revocation of the Edict of Nantes, and took refuge in Geneva. When the persecution under Louis XIV. drove the Protestants of the Cévennes to revolt, Cavalier returned in 1702 to his own country, where he became one of the leaders of the insurrection, which broke out in July of that year. Roland was put in chief command, but Cavalier soon rose to be his equal, and, though untrained in arms, he displayed extraordinary skill as well as courage. Although the 'Children of God,' as the insurgents were called, numbered at the most not more than 3000 men, they coped successfully with the far greater forces of the King, and were never entirely conquered. After several conflicts, Cavalier changed the seat of war to Vivarais, and on February 10, 1703, defeated the royal troops at Ardèche. A few days later he was himself defeated, but was successful in subsequent encounters, invaded the region of the plains, and even threatened Nîmes. In April, 1704, he was defeated by Marshal Montrevel, but retreated with two-thirds of his forces. When Marshal Villars was sent against the Camisards, Roland remained obdurate, but Cavalier agreed to treat, and received a colonel's commission and a pension, while his father and other Protestant prisoners were liberated. As this treaty did not secure general liberty of conscience, Cavalier was denounced as a traitor, and was so disheartened by his treatment everywhere that he left France for Switzerland, and from there passed to Holland, where he married. He then entered the service of England, became the head of a regiment of French refugees, and served with the English forces in Spain in 1705. After his return to England he was made a major-general and Governor of Jersey, and finally Governor of the Isle of Wight. He died at Chelsea in 1740. Cavalier published in 1726 his *Memoirs of the Wars of the Cévennes.*

CAVALIERI, kä′vȧ-lyā′rē, Bonaventura Francesco (1598-1647). An Italian mathematician and astronomer. He was educated at Pisa, and was a pupil of Castelli. In 1629 he was made professor at Bologna, where he died. His chief contribution to mathematics is the method of indivisibles, first conceived in 1629 and published in 1635. This method forms a connecting link between the Greek method of exhaustions and the methods of Newton and Leibnitz. The basal idea of the method consists in considering a line as composed of a series of points (or small line-segments of equal length), a surface as composed of a series of adjacent lines (or strips of area of equal width), and a solid as composed of a series of planes (or laminæ of equal thickness). In general, however, a summation of such elements, if they are finite (no matter how small), only approximates, but does not equal, the length, area, or volume of a given magnitude. E.g. consider a triangle as composed of a series of very narrow rectangles constructed on its base; the sum of such elements will differ the less from the area of the triangle, the smaller the width of the rectangles; but as long as that width remains a finite quantity, the difference in area will, evidently, likewise remain finite. Nevertheless, with the aid of limits, the method may be used to determine the ratio of the area of a given figure to that of another figure whose area is known. In fact, it was thus actually employed for measuring areas and volumes for more than half a century before the introduction of the integral calculus. For example, it was used to prove the proposition that two solids lying between two parallel planes, and such that the two sections made by any plane parallel to the given planes are equal, are themselves equal; as, for example, S and S′ in the accompanying Fig. 1. Such solids are called Cavalieri bodies. This forms one of the best bases for proving that the volume of a sphere is $\frac{4}{3}\pi r^3$ for, as may be seen from Fig. 2, the area of the ring CD is easily shown to be $\pi(r^2 - x^2)$, and this is also easily shown to be the area of the circle AB. Hence the sphere and

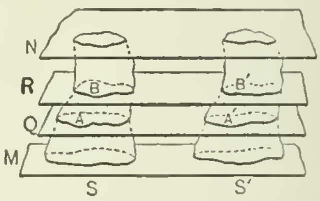


FIG. 1.

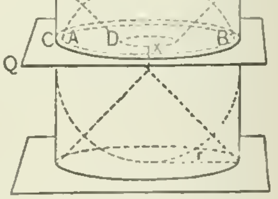


FIG. 2.

the difference between the cone and cylinder are two Cavalieri bodies, and are therefore equal. Hence

$$v = \pi r^2 . 2r - \pi r^2 . \tfrac{2}{3}r = \tfrac{4}{3}\pi r^3.$$

This method solved many difficult problems and enabled Cavalieri to give a satisfactory demonstration of Guldin's theorem, published in the *Exercitationes Geometricæ Sex* (1647). By means of it, also, Torricelli proved that the area of a cycloid (q.v.) is three times the area of the generating circle. Since the method of Cavalieri, combined with the modern theory of limits, offers an easy and correct way of expressing the areas and volumes of several elementary forms, and since it is a natural stepping-stone to the methods of integral calculus, it is desirable material for elementary instruction. Cavalieri's chief works are: *Geometria Indivisibilibus Continuorum Nova Quadam Ratione Promota* (Bologna, 1635); *Exercitationes Geometricæ Sex* (Bologna, 1647): *Specchio ustorio overo trattato delle settioni coniche* (Bologna, 1632); and *Trigonometria Plana et Sphærica* (Bologna, 1635).

CAVALIERI, kä'vȧ-lyā'rē, or **CAVALIERE**, -rā, Emilio del (c.1550-c.1599). An Italian composer. He was born in Rome of excellent family, received a good education, and was called to the Court of the Medici in Florence as "Inspector-General of Art and Artists." He had a dislike for contrapuntal music, and aimed at giving expression to the monodic style by supplying an accompaniment in figured bass (*basso continuato*) and laying particular stress on the melody, which he embellished with grupettos and trills. He wrote numerous madrigals and musical plays, of which *Disperazione di Fileno, Il satiro* (both 1590), and *Giuoco della cieca* (1595) are by many considered the first operas. His great work *Rappresentazione di anima e di corpo*, which was performed in Rome in 1600, is also regarded as the first oratorio. He died in Florence.

CAVALLARI, kä'vȧl-lä'rē, Francesco Saverio (1809-96). An Italian archæologist, born in Palermo. He is principally known for his discoveries of Sicilian antiquities. He was also director of the School of Fine Arts in the City of Mexico from 1856 until 1863. Then he returned to Sicily, and became director of antiquities there. His publications are: *Ritratti Messicani* (1866); *Belle arti e civiltà* (1868); *Relazione sullo stato delle antichità di Sicilia, sulle scoperte e sui ristauri fatti dal 1860 al 1872* (1873), and some memoirs.

CAVALLERIA RUSTICANA, kȧ-väl'lȧ-rē'ȧ rōō'stē-kä'nȧ. See Mascagni, Pietro.

CAVALLI, kȧ-väl'lē, Francesco (c.1600-76). An Italian composer of music, whose real name was Pietro Francesco Caletti Bruni. He was born in Crema. His father was *maestro di capella* at the Church of Santa Maria, and the boy's talent gained him the patronage of Federigo Cavalli, podestà of Crema, whose name he assumed. He studied under Monteverde, and was his greatest pupil and follower. He was made organist in San Marco in 1665, and in 1668 became *maestro di capella*, holding this post until his death, in Venice, in 1676. A collection of Cavalli's church music was published in Venice in 1656, some vespers for eight voices in 1675, and an 8-part *Requiem*. But it is as a dramatic composer that Cavalli is celebrated. He treated the style developed by Caccini, Peri, and Monteverde with greater freedom in rhythm, and, though his harmony is crude, he gave greater dramatic expression to the whole. By introducing solos and set numbers into the opera, he prepared the way for Alessandro Scarlatti (q.v.), the real creator of modern opera. His operas (42 in number) contain much music that is admirable even from a modern point of view. His operas include: *Le Nozze di Tetide e di Peleo* (1639); *La Didone* (1641); *Il Giasone* (1649); *Alessandro* (1651); *Il Serse* (1654); and *L'Artemisia* (1656). Consult Ambros, *Geschichte der Musik*, Vol. IV. (Leipzig, 1878). For a sketch of Cavalli's importance in the development of dramatic composition, see Opera.

CAVALLI, Giovanni (1809-79). An Italian soldier and inventor, born in Turin. Sent by the Piedmontese Government to Sweden to investigate the manufacture of cannon, he began (1846) those experiments with breech-loading guns which became the basis for all similar innovations since made. The guns constructed by him were first used by the Piedmontese artillery at the siege of Gaeta in 1860-61. In 1865 Cavalli became commandant of the Military Academy in Turin. Among his numerous publications, all of which are written in French, the following is especially noteworthy: *Aperçu sur les canons rayés se chargeant par la bouche et par la culasse et sur les perfectionnements à apporter à l'art de la guerre en 1861* (1862).

CAVALLINI, kä'vȧl-lē'nē, Pietro (1270-1350). An Italian painter and mosaicist. He was a pupil of the school of the Cosmati (q.v.), the Greek mosaicists, and assisted some of that family in their work in the Roman churches. Afterwards he worked with Giotto, and may have helped him with the mosaics in the porch of Saint Peter's. He is known to have been in Naples in 1308, in the service of King Robert. Of his frescoes little remains. The mosaics attributed to him in Santa Maria in Trastevere are by the Cosmati; those in San Paolo Tuori le Mura are his, probably executed between 1316 and 1334. The "Crucifixion" at Assisi, attributed to him by Vasari, is the work of the Sienese Ambrogio and Pietro Lorenzetti.

CAVALLOTTI, kä'vȧl-lôt'tē, Felice (1824-98). An Italian dramatist and politician, born in Milan. When only 18 years of age, he published *Germania e Italia*, a bitter attack on Germany, and joined the forces of Garibaldi. Subsequently he turned his pen against the Italian Government and was repeatedly sentenced to imprisonment. After his release he wrote his first successful play, *Pezzenti* (1871). This was followed by *Alcibiade* (1874), which met with extraordinary success. He was elected deputy in 1873 and frequently reëlected. In Parliament and also as editor of the *Secolo* he was a consistent Republican. He was killed in a duel in Rome.

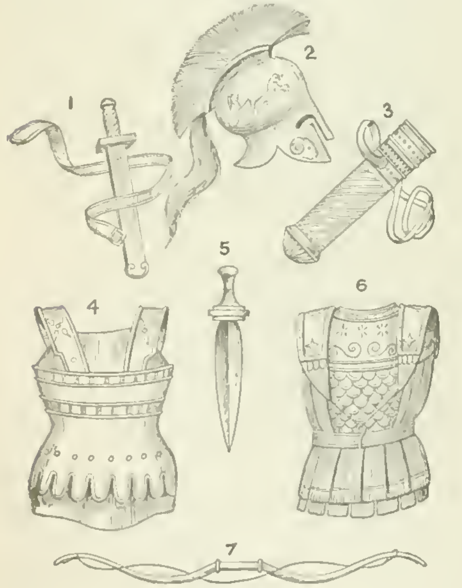
CAVAL'LY (Sp. *caballa*, horse-mackerel, from *caballo*, horse, from Lat. *caballus*, horse), or Crevalle. A carangid fish (*Caranx hippus*) of the Atlantic coast of the United States and southward, allied to the pompano, and typical of the large genus Caranx. Its usual weight is about 10 pounds, and it is highly esteemed, when young, as food. It is a voracious, predatory fish, takes the hook readily, and often feeds in the surf, where it affords sport with a rifle. A second, more slender species (*Caranx pisquetus*) is called horse-cavally (a tautological name, as cavally is a corruption of the Spanish-American name *caballa*, 'horse'), and is known in the New York market as yellow mackerel, or hard-tail. See Plate of HORSE MACKEREL.

CAVALRY (Fr. *cavalerie*, It. *cavalleria*, from Lat. *caballus*, horse). A name given to soldiers trained to fight mounted, or also on foot.

ANCIENT CAVALRY.

The earliest mention of military horsemen is found in the Bible. In Genesis and Isaiah the horses and horsemanship of Palestine and among the Arabs are highly extolled. Diodorus, the historian, mentions an expedition of 20,000 horsemen to put down a rebellion in Bactria. It is probable that the war chariot antedated cavalry as a fighting arm; with scythe-blades attached to the end of the axles the chariot became not only a terrible engine, but was also useful to transport foot-soldiers quickly to the battlefield. The creation of regular cavalry is ascribed to the Egyptian King Rameses II., about B.C. 1330.

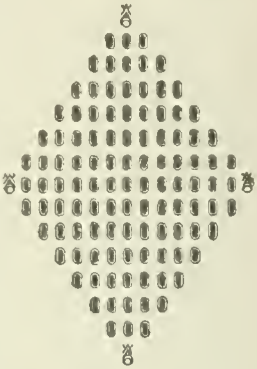
The earliest cavalry arms were the lance, the javelin, and the bow. Of these the first named has alone survived the changes of centuries and is used to-day, side by side with the latest arms of precision and the newest weapons of war. "In a barbarous country" (says Marshal Marmont), "where industry has not yet found its way, where there exist neither manufactories nor armories, nor money wherewithal to buy arms abroad, a man mounts his horse and wants a weapon. He cuts a long branch of light wood, sharpens the point, hardens it in the fire, and there is his lance. Later he procures a nail and fastens it to the end: his weapon has already become more dangerous. Finally, this staff is furnished with an iron tip regularly shaped, and behold the lance which is now generally adopted." A javelin or dart is a small lance to be thrown, and was often made so as to break or bend upon piercing an enemy's body.



GREEK CAVALRY ARMS AND ARMOR.

1, sword; 2, helmet; 3, quiver; 4, cuirass of metal; 5, pointed sword or dagger; 6, cuirass of metal scales and leather; 7, bow.

An early writer on horsemanship is Xenophon; he states that the Greeks used cavalry in war as early as B.C. 743. Epaminondas did much to develop this arm as a military force, raising and training a body of 5000 mounted men. The Grecian cavalry under Philip of Macedon and Alexander the Great won great renown. It was divided at first into two classes — heavy and light—to which Alexander added a third, trained to fight either on foot or on horseback. The heavy cavalry consisted of men carefully selected and who supplied their own horses; the remainder were mounted by the State. The heavy horsemen wore cuirasses of mail, and carried a long lance and a short sword; the light horse were without armor, and carried javelins, daggers, and bows; all rode bareback.



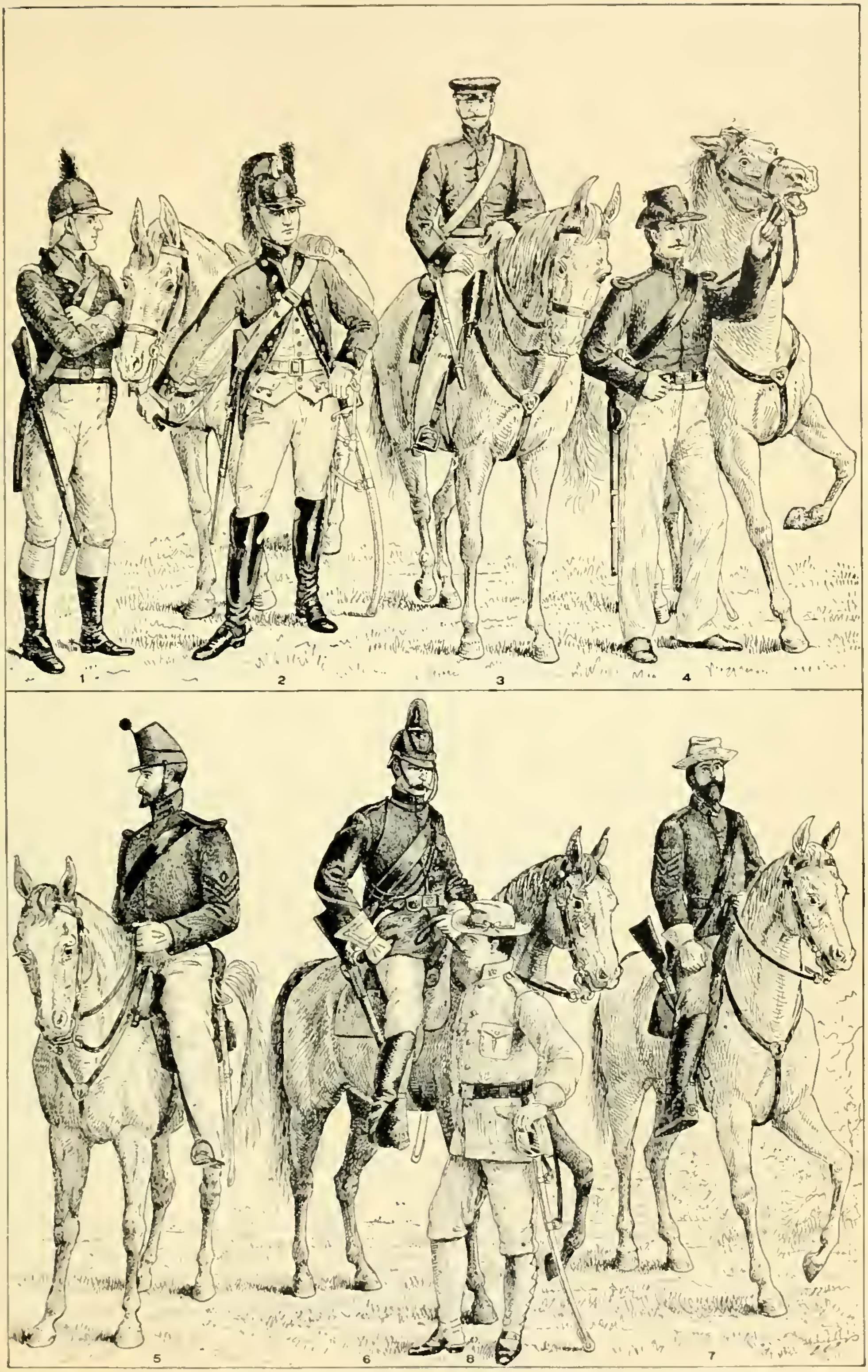
CAVALRY ILE.

The tactical unit of this force was the 'ile' (ἴλη) of 64 men; the formation of the ile was 16 front and 4 deep, or 8 front and deep. They sometimes charged in line, but generally in oblong, wedge-shaped columns, the head of which was driven against the enemy like the point of a spear to penetrate their line: two of these triangles were sometimes joined in the shape of a lozenge, as above.

This formation was abandoned by Alexander for a more open order and extended front, that which he applied at Arbela, where he defeated Darius, King of Persia. The Greek cavalry numbered 7000, divided into two wings. The Persians, clad in armor, outnumbered their opponents, who were dressed and armed as light cavalry. Alexander, leading his right wing, rapidly extended his lines so as to overlap the enemy's front, who, in trying to meet this unexpected movement, left a gap which Alexander promptly occupied, separating the Persian forces and driving them back in confusion. Having thus disposed of part of the enemy, Alexander concentrated his force upon the remainder of Darius's army, which he routed and pursued a distance of 75 miles in 24 hours. The tactical principles illustrated in this engagement form the basis of the best modern cavalry methods. After the death of Alexander, the Greek cavalry gradually sank into insignificance.

The Romans gave more attention to their infantry than to their cavalry, which, indeed, suffered from want of horses and competent leaders. Their system resembled that of the Greeks in that it comprised the heavy, the light, and a kind called *velites*, trained to fight on foot as well as on horseback. In fact, by reason of their close union with the infantry on the battle-field they were inclined to dismount upon the slightest pre-

CAVALRY—UNITED STATES ARMY

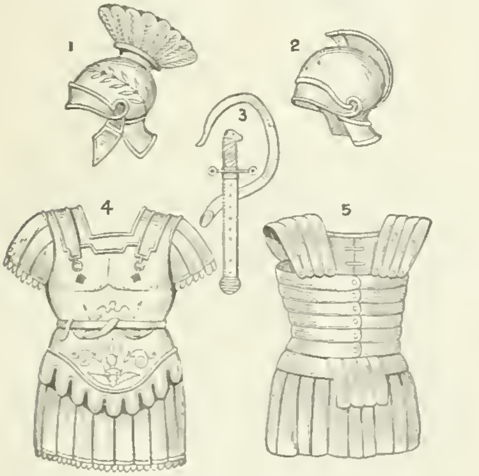


1. CAVALRYMAN OF THE REVOLUTIONARY WAR.
2. CAVALRYMAN OF THE EARLY ARMY, 1799-1802.
3. DRAGOON—Mexican War Period.
4. CAVALRYMAN—Period of the Civil War.
5. DRAGOON—Period Before the Civil War.
6. CAVALRYMAN—Full Dress Uniform 1888-1902.

7 and 8. CAVALRYMAN IN SERVICE DRESS.

text. "At Cannæ," says Polybius, "when the Spanish and Gallic cavalry, advancing from the left wing of the Carthaginians, encountered the Romans, the conflict that ensued was, indeed, most warm and vehement, such as resembled rather the combat of barbarians than a battle fought by disciplined and experienced troops. For, instead of falling back and again returning to the charge, as the custom was in such engagements, they had scarcely joined, when, leaping from their horses, each man seized his enemy." Roman writers assert that their cavalry were often successful with this method of fighting, although the modern light cavalryman would make short work of such imprudence. In their encounters with the Carthaginian cavalry the Romans sustained crushing defeats. Hannibal appreciated the value of cavalry. His favorite methods of employing the arm were (1) to turn the enemy's wings and attack him in flank and rear, and (2) to place a mounted corps in ambush and suddenly fall upon his rear. The best Roman generals, lacking cavalry, were forced to avoid the plains and take up positions upon the hills, as safer for their operations.

Eventually the Romans, whose proportion of cavalry to infantry had been one-tenth, increased it to one-fourth, with which increase and improved training, at the battle of Zama, they were enabled to drive back the Carthaginian cavalry and thereupon attacked Hannibal's infantry in flank and rear, defeating it with a loss of 20,000 men. The Roman cavalry rode without saddles, but their horses were equipped with leather housings. They were armed like the Greeks, although the sword had a very broad, sharp blade, and was worn on the right side, suspended by a belt from the shoulder; under Vespasian the sword was removed to the left side, and its place was taken by a dagger. A helmet, a cuirass (of leather or metal), and a small round buckler completed the soldier's equipment.



ARMS AND ARMOR OF ROMAN CAVALRY.

1 and 2, helmets; 3, cavalry sword; 4, cuirass of general officer; 5, coat of mail of soldier.

The Romans fought with face uncovered; some of the opposing allies wore a leathern helmet closed in front, and said to be the prototype of the knight's helmet, with visor down, of mediæval times. The cavalry, when first organized in the regal period, was composed of the better class of citizens, and the *celeres*, or king's bodyguard, consisted exclusively of young noblemen. Toward the end of the Republic the knights began to withdraw from the army, and it was thereafter recruited largely from foreigners. The Roman legion originally consisted of 3000 infantry and 300 cavalry. This mounted body was, by Servius Tullius, increased to 2400. "The cavalry was divided into ten troops (*turmæ*): the first, as the companion of the first cohort, consisted of 132 men, while each of the other nine comprised 66. The entire establishment formed a regiment of 726 horses, naturally connected with its respective legion, but occasionally separated to act in the line and to compose a part of the wings of an army." (Gibbon.) These companies, or *turmæ*, were formed in various ways—at one time in eight files and four ranks; afterwards in three sections of three files or three ranks, each section commanded by its *decurio* (lieutenant), and followed by its *uragus* (file-closer); and at a later period into ten files and three ranks, commanded by the first *decurio*, the two others being posted, one on either flank.

Hannibal's auxiliaries included both Numidian and Gallic horsemen. The first were small men, on small, active horses, which were managed solely with a leather thong. In their manner of fighting the Numidians resembled the Cossacks. "In his formation for battle, Hannibal threw into the centre of his line all the bridled and heavy cavalry, and placed the Numidians on the wing, that they might be ready to surround the Romans." (Polybius.) The Gallic cavalry were perhaps the most efficient of the auxiliaries. Like the Greeks and Romans, they had no saddles, which date only from the time of Constantine, nor stirrups, which were invented by the Franks. For that reason, cases of hernia were quite common among these troops.

MEDIÆVAL CAVALRY.

In the so-called 'age of chivalry' war became to a great extent a matter of individual combat. Military science languished during a period devoted to knights in armor—tournaments at which fair ladies encouraged champions to 'break a lance.' Indeed, that weapon became the real badge of nobility; and in France at one time serfs were forbidden to use it. The lance was reserved, under the laws instituted by William the Conqueror, for the use of 'freemen.' Eventually, in consideration of its practical value, the lords permitted their vassals to use, in time of war, a lance, the head of which was never burnished, and at the close of the war was hung on the wall and allowed to rust, "lest the vassals should grow too proud." To this day, in France, the old gun blackened with smoke or the rusty sword may be seen over the fireplace of the peasant, as in mediæval times rested the smoked lance of his forefathers. Other arms of this period were the long, heavy sword, two-edged, often straight on one side and waved on the other; an axe added to the pike became the forerunner of the halberd—the 'morgenstern' (morning star) of the Germans, used by the Swiss at the battle of Morgarten (A.D. 1315), and the 'goaden dag' (good day), which the Flemings used with terrible effect at the battle of Courtrai (1302). Other rude weapons, inventions of the blacksmith, were called gisarms or bisarms. The nature of these weapons caused a revival of the heavy plate armor of the ancients, vastly improved in point of flexibility, and worn both by horse and rider. The expense of this outfit was of course enormous. At the siege of Harfleur (1415), Comte Saint Pol's 'chanfrain' (horse-head armor) cost $30,000, and that of Comte Saint Foix $15,000; both were inlaid with gold and jewels. The horses were more vulnerable than their riders, as their legs were exposed to attack. The rider, when dismounted, was assailed with mace, battle-axe, or stones, in the attempt to crack his shell. At the storming of fortresses the knights dismounted and fought on foot, and Père Daniel says "that the splendor and extent of victories was always denoted by the number of knights, squires, and other gentlemen who had been killed or taken." Tactics were unknown among the early knights. In battle they formed in single rank, and each sought out his opponent and rode against him with couched lance, in order to disable or capture him.

While one may smile at the mediæval horseman with his cumbrous armor, still his training in the use of arms, management of his horse, and self-reliance were valuable from the cavalry point of view. While that arm as a force in war had lost prominence, it was by no means dead. At the beginning of the Eighth Century the Frankish Army was largely composed of mounted men. In the Tenth Century Europe suffered greatly from the incursions of the Hungarian horsemen until Henry I. of Germany, reorganizing his cavalry and adopting the methods of the common enemy, finally defeated them. In 1241 the Mongols invaded Central Europe and encountered the heavy, armor-clad cavalry of those regions, and the struggle between the two systems ended in victory for the light horsemen. The Mongols would not stand a charge, but, dispersing, would exhaust their opponents in pursuit, and then rallying, would turn, and, rushing upon the broken masses, speedily decided the contest.

KNIGHT MOUNTED, 1558.

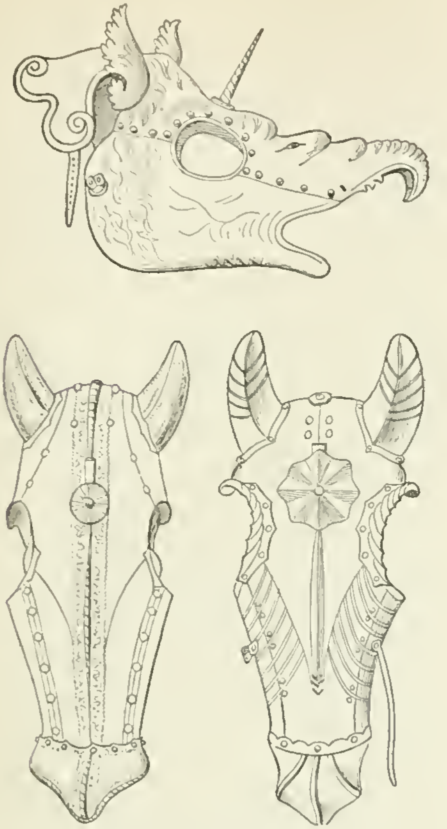
The application of gunpowder to war purposes in Europe early in the Fourteenth Century (although its origin is variously ascribed to the Chinese and to the Arabs), wrought a revolution in things civil as well as military. War became a science, and in 1445 Charles VII. of France first organized a standing army and infused new life into the cavalry arm. The soldiers were assigned to permanent quarters and placed under rigid discipline. The men who formed the retinue of the knight (called 'servientes,' the original of our 'sergeant'), took the name of gens d'armes. The King divided his cavalry into 15 companies of 100 lances each, the term 'lance' meaning a squad; thus each company numbered 600 mounted men, making an aggregate of 9000. There were also volunteers attached to the gendarmerie on probation. Each homme d'armes had four horses, including his war charger, mounted only when battle was imminent. Thus, it is said, originated the expression, 'mounting one's high horse,' or showing a readiness to quarrel.

GERMAN REITER, 1640.

The towns and provinces, in return for the protection afforded by this force, bore the expense of their support. In 1559 the last vestige of the romance of war (the tournament) was destroyed by the death of King Henry II. of France, who, while engaged in a joust, was unhorsed and accidentally pierced through the visor of his helmet by a lance in the hands of a courtier, Count Gabriel de Montgomerie.

About the beginning of the Fifteenth Century we find mention for the first time of certain kinds of cavalry whose names are familiar at the present day. In Hungary the 'hussars,' so called from the Hungarian word *húsz* (signifying twenty) and *ár* (pay), were organized under a State ordinance requiring every twentieth man to take the field. They were armed with a sword (sometimes two), rode small horses with light saddles, were well disciplined, and very mobile in battle. Mahan well describes the type: "The dashing, bold hussar, that epitome of military impudence and recklessness at the tavern, should present these qualities in a sublimated form on the field. Regardless of fatigue and danger, his imagination should never present to itself an obstacle as insurmountable." The hussar has always been noted for extravagance in dress, but the Polish hussars at the time of the wars with Charles XII. were unique. "They march," says Voltaire, "attended by several valets, who lead their horses, which are adorned with bridles, plaited with silver and silver nails, embroidered saddles, saddle bows, and stirrups gilt, and sometimes made of massive silver."

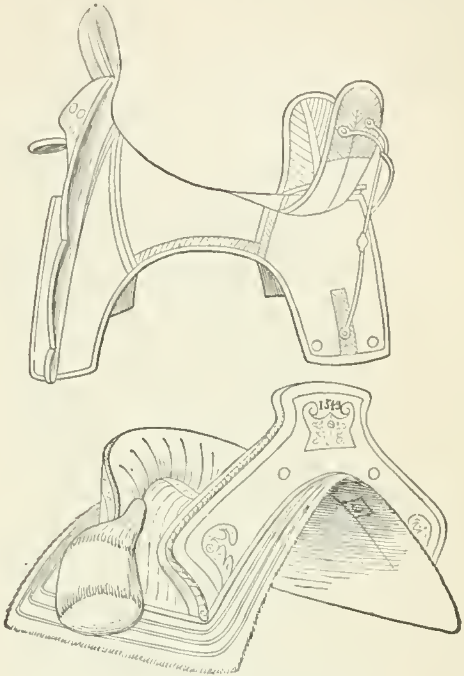
Long before this we hear of 'carabineers' (from the Arab word *Karab*). They were armed with an arquebuse, a pistol, and a long, straight sword; they were drilled to load at full speed and to fire from the saddle. Placed on the flanks of squadrons, they prepared the way for the charge by their effective fire. In England they were called 'hargobusiers.' They occasionally took up infantrymen behind them. This use of horsemen to move infantry rapidly in an emergency originated the term 'dragoons.' See MOUNTED INFANTRY.


"CHANFRAINS"—HORSE-HEAD ARMOR.

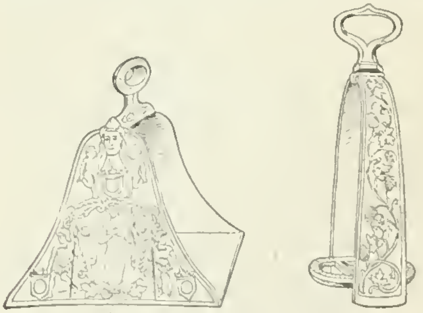
CAVALRY IN MODERN TIMES.

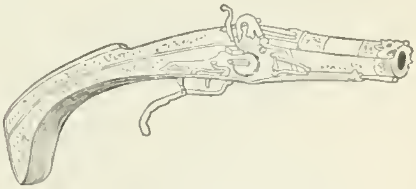
The War of Independence of the Netherlands (1568-1609) marked the beginning of a new era in cavalry history. Maurice of Nassau drilled his German mercenaries, more lightly armed and mounted than their Spanish opponents, to form in two or three lines, to move rapidly, and to make direct charges, after first firing their pistols at the enemy. He it was who first organized regiments of 1000 men, raised by selected recruiting officers who became the colonels; their commissioned subordinates were called lieutenant-colonels and majors, as in the armies of to-day.

The great improvement begun by Prince Maurice was continued and enlarged by the great soldier Gustavus Adolphus. He made important changes in the discipline, armament, pay, clothing, and training of his cavalry. They were formed in four ranks, of which one was held in reserve during a charge. Unlike their foes, they were frequently paid, and to a certain extent restrained from such excesses as were common in those times. Captain Dalgetty's view, "A cavalier of honor is free to take any part which he may may find most convenient for his own peculiar," was the popular one. The Austrian cavalry was heavier than the Swedish, with a more massive formation (eight to ten ranks), and thus his mounted troops contributed greatly to Gustavus's successes at the battles of Leipzig (1631) and Lützen (1632). They became models for all European States, and Louis XIII. of France still further reduced cavalry formation



SADDLES OF MEDIÆVAL CAVALRY.


ORNAMENTED CAVALRY STIRRUPS.


EARLY CAVALRY PISTOL, "THE DRAGON."

to three ranks. The armament and equipment were also lightened, but movements were not so rapid in action.

In the reign of Louis XIV. there appeared a galaxy of stars military in the persons of Turenne, Luxembourg, and Condé on one side, and Marlborough, Montecuculi, and Eugène on the other, and a decided advance was made in the movements of armies, but no important changes in cavalry methods. Again, the Swedes came to the front under the rule of Charles XII., and radical alterations were instituted. He made the cavalry independent of the infantry, and taught it to rely upon the sword and bold and impetuous charges for success. "His daring and chivalrous character was suited to the spirit of cavalry tactics; he led his horsemen, sword in hand, against cavalry, against infantry, against fortified positions, over any country. . . . Untiring in pursuit, he followed up the Saxons under Marshal Schulenburg in their retreat into Silesia, for nine consecutive days without unsaddling, overtook them at Sänitz, near Punitz, and, with two regiments of cavalry only, charged them, 10,000 strong, rode over their infantry, who lay down to avoid the impetuous rush of the Swedes, defeated and drove the Saxon cavalry off the field, and then returned to attack the infantry and guns." (Nolan.)

After Poltava (1709), war ensued between Russia and Turkey, in which the cavalry of the latter power, which had long been the best in Europe, bore a conspicuous part. Their horses, admirably trained, their sharp scimitars and skill in harassing the enemy made them a terror to the less mobile Russians, whose infantry were compelled to carry with them portable chevaux de frise and add pikes to their armament in order to hold their own against the Turks. In the Polish Army, about 1717, there were the Tartar hussars who bore a cuirass covered with a panther's skin slung over the back, the head being fastened on the left shoulder. The backpiece of the cuirass was adorned with feather wings. They carried a gilt lance 14 feet long with a small flag near the point which, fluttering in the attack together with the rustling of the wings, was intended to frighten the enemy's horses. The French in the meanwhile, under Louis XV., restored the lance, but otherwise lightened the equipment of their mounted troops. The brilliant Marshal Saxe recognized and applied the experience of the Austrians and Russians to the development of the French cavalry. As to the importance of mobility, he held that "the secret of victory resides in the legs of the soldiers," and as to horsemen, "such as cannot go at speed over a couple of thousand yards to pounce upon the foe is good for nothing in the field."

Frederick the Great ushered in a brilliant cavalry epoch. At the commencement of his reign his army of 80,000 contained 60 squadrons of heavy and 51 of light cavalry—about 13,000 men. They were 'heavy' in every sense—their quickest gait the trot, their most serious performance a pipe-clay parade. At the battle of Mollwitz they received a lesson from the Austrians, who charged them in the Turkish manner and drove them, including their royal master, in confusion from the field. Frederick profited by this example to reorganize his cavalry after the methods of Saxe, laying down a rule that "all evolutions are to be made at the greatest speed, . . . the cuirassiers to be as handy and expert on horseback as a hussar, and well exercised in the use of the sword. Every squadron as it advances to the charge must attack the enemy sword in hand, and no commander shall be allowed to fire under penalty of infamous cashiering. . . . Every officer of cavalry must ever bear in mind that there are but two things required to beat the enemy: first, to charge him with the greatest possible speed and force; and second, to outflank him." With these admonitions, and led by the invincible Seydlitz and Ziethen, the Prussian cavalry performed wonderful feats in the historic battles of Strigau, Rossbach, Leuthen, and Zorndorf. The Prussian leaders combined great boldness with skill in manœuvring in the presence of the enemy, of which Rossbach (1757) was an instance. The French and Imperialists, confident in their numbers, approached carelessly, exposing their flank to the Prussian advance under Seydlitz, who instantly, without waiting for his infantry, charged with his 4000 mounted men and completely routed the allies, who lost 3000 killed and wounded, 5000 prisoners, and 70 guns. (Wagner.) At Zorndorf (1758) the success was still greater. There Seydlitz with 26 squadrons not only turned the fortunes of the day, but checked the victorious Russian cavalry, drove it from the field, returned, fell upon the Russian infantry, which stoutly resisted, and when broken by the Prussian horsemen rallied, again and again, but finally gave way with immense loss. Ziethen was equally distinguished, and by his vigilance at Hochkirch (1758) saved Frederick and his army from a surprise. It is said that of twenty-two general engagements Frederick's cavalry won fifteen. "In reviewing the deeds of the Prussian cavalry of those days it must be borne in mind that they dealt with infantry which sought the open plain, advanced in long lines — avoiding obstacles of all descriptions, because such obstacles disturbed their array. Their fire was quick, but not true in its aim, and their squares seldom held out long against the horsemen." (Nolan.)

Napoleon endeavored to introduce Frederick's methods into the French cavalry. In 1806 at Jena and Auerstädt he first pitted his cavalry against the Prussians with brilliant results. The boldness which characterized the Prussian system was reproduced, but the speed in the charge, skill in manœuvres, and good judgment on the battlefield were often lacking. The French, with 80,000 cavalry, were badly mounted, not good horsemen, heavily equipped, and, while employed in masses, seldom provided reserves. A notable instance of the last-named defect occurred in 1813 near Leipzig. Murat, at the head of 5000 horse, charged the centre of the allied army, rode down the Russian cavalry of the guard, took 30 guns, and pierced the enemy's centre; but 400 Cossacks, skillfully handled, attacked the French cavalry, gaining their flank by a narrow by-path, retook the guns and caused Murat to retire in disorder. A similar error at La Rottaire resulted in the loss of 28 guns to Napoleon. There were some brilliant exceptions to these failures, the most important being Kellerman's decisive charge at Marengo (1800) when the Austrians, having practically defeated the French army, were advancing with more zeal than care; suddenly a French battery, hitherto concealed by an accident of ground, fired a parting shot at the head of the Austrian column which caused great confusion. General Kellerman, at the head of 200 sabres, seized the opportunity to fall upon the enemy's exposed flank, rode over the leading battalions, and produced a panic in the entire allied force, which fled from the field, leaving behind them their commander and 2000 prisoners. But if less fortunate in operations en masse, Napoleon surpassed Frederick in the use of cavalry on outpost and scouting duty. His troopers were ubiquitous as the 'eyes and ears' of his army. While Napoleon's cavalry was taught to place its principal dependence upon the sabre, he authorized, on occasions, the use of firearms. At Eylau (1807) the colonel of the Twentieth Chasseurs à Cheval observed a large force of cavalry advancing toward his position, moving slowly through the snow and heavy ground. Ordering his officers into the ranks and his men to 'advance carbine,' the colonel waited until the enemy's leading files were within six paces, when the command to fire was given with great effect. Although in the mêlée which ensued the French regiment lost 100 men, the Russians left nearly 300 on the spot from which they were forced to retire. (Wagner.) At Somo Sierra in the Peninsular campaign (1808) the Third Polish light cavalry charged directly in front of an intrenched battery strongly supported by infantry guarding a mountain defile, drove back the Spaniards and captured 16 guns. This desperate but successful feat was accomplished by General Montbrun, who led the regiment in person.

In Spain, at that time, there were many gallant actions. Under Wellington the cavalry of the German legion attached to the British army was conspicuous, making, on one occasion, according to the French general, Foy, "the most daring charge during the Peninsular War." At Garcia Hernandez (1812), when the French army was retreating, three squadrons of Bock's German brigade, which had been ordered to charge the cavalry of the enemy's rear guard, unexpectedly encountered three battalions of infantry formed in squares. Without hesitation, Bock's cavalry charged these squares, successfully penetrating them at places where wounded horses or falling men had caused a gap in the side of the square. The vigor and skill with which this small force (about 110 sabres) was handled resulted in the dispersion of the French infantry with a loss of 1 general officer and 1000 men; the German casualties were 4 officers, 48 men, 67 horses killed, and 2 officers, 56 men, 46 horses wounded, with 6 men missing.

Napoleon's disastrous Russian campaign demoralized his cavalry. The intense cold, deep snows, want of food for horses and men, and ceaseless encounters with the Cossacks reduced the French horsemen in numbers and spirit. General Morand says of the Cossacks: "These natural horsemen are not organized in divisions, pay no attention to regular alignments, rest their feet in great stirrups which serve as supports when using their weapons; trained to pass at once from the halt to the gallop and from the gallop to the halt, their horses second their dexterity. These ungroomed animals of irregular size, supplied by their riders, possess wonderful endurance, are guided entirely by the snaffle, and easily accomplish 100 verst (66 miles) in twenty-four hours." Their method of attack in Napoleon's time called 'the lava,' consisted of a charge in small, irregular groups—in open or close order as circumstances seemed to require—these 'groups' hovering around the enemy until launched at a vulnerable point. Since then the close association with the regular system of the Russian Army has caused the lava to degenerate into a simple 'charge as foragers.' In some respects the Cossack methods are not unlike those of the North American Indian of the plains.

The Crimean War was remarkable for the cavalry errors committed. Neither the Russians nor the Allies employed the arm effectively either for reconnaissance, outpost, or in large bodies on the battlefield. The most unfortunate instance of this nature, the charge of the Light Brigade at Balaklava (1854)—where gallant men were sacrificed through the folly of their commander and the ambiguity of an order, gained undying fame by a poet's pen. On the same field the heavy cavalrymen of both armies met—the one body at a slow pace, the other at a halt—with negative results. From the experience of the Crimea and that of the Italian campaign of 1859 doubts arose as to the value of cavalry in future operations, Austria making a decided reduction in that arm. "The awakening from this transient period of theory came from a nation not trained to arms, and it is to the American Civil War that we owe the revival that took place in the use of the cavalry arm." (Liddell.)

The experience gained in the Civil War in the United States (1861-65) laid the foundation for renewed confidence in the value of mounted troops and led to many changes in the armament, equipment, and instruction of European cavalry. At the outset the aged General Scott and the new commander of the United States forces (McClellan) did not expect that a large mounted force would be needed. In the North and West people were not accustomed to the saddle; in the South the majority were good horsemen. So it happened that the Confederates, at the beginning of the war, displayed greater mobility in their operations, screened them effectually, and were better informed as to the enemy's movements than were the Union troops. The lesson of the first year taught the United States Government the importance of a due proportion of cavalry in the composition of its armies, and by the spring of 1863 the Union cavalry were able to cope with the Southern horse. The mounted service of the United States in 1861 consisted of two regiments of dragoons, one of mounted rifles, and two of cavalry, variously armed, but later in that year another regiment was created and all were armed alike, with carbine, pistol, and sabre, were taught to fight as 'dragoons,' and were denominated 'cavalry.' On this basis was organized a great body of volunteer horsemen, eventually aggregating 300,000. The Confederates created their mounted force principally from the many mounted militia regiments and the thousands of good horsemen with which their section of the country abounded; these were officered in many cases by ex-officers of the United States Army and by young planters. For want of carbines and sabres many Southern organizations were armed with rifles, but as a rule with sabre and pistol. It has been said that these troops were not 'cavalry' in the European sense. On the other hand, it has been urged that they were cavalry of the most efficient and versatile description.

In 1862 the Confederate cavalry leader Stuart, with a small brigade and a battery, made a reconnaissance (or so-called 'raid') from Richmond, Va., passing entirely around the Army of the Potomac, in position near that city, obtaining valuable information as to McClellan's position, destroying supplies, driving in outposts, swimming swollen streams, and returning home by a swift detour with the loss of one officer killed. In 1863 the Union general Pleasanton made a reconnaissance in force with 7981 cavalry, 3000 infantry, and 24 horse-artillery guns to discover, if practicable, General Lee's intentions. The movement was carried out with so much secrecy that upon crossing the Rappahannock River early in the morning of June 9, the enemy's cavalry—8500 strong, with 20 guns—was surprised, but recovering, engaged Pleasanton's command near Brandy Station, and a great cavalry battle ensued which lasted ten hours and ended with the ultimate withdrawal of the Union troops unmolested, at nightfall, having accomplished their purpose. The action was spirited, and a number of mounted charges were made in which the sabre was freely used, although there was some dismounted work with the carbine. The infantry did not take an active part, but remained in reserve, covering Beverly Ford in the rear of the Union force. Pleasanton's casualties aggregated 932; those of Stuart about 500; the loss in commissioned officers was heavy. The occasion marked a new departure in the history of the war; in the language of Colonel McClellan, chief of staff to General Stuart, "It *made* the Federal cavalry. Up to this time confessedly inferior to the Southern horsemen, they gained, on this day, that confidence in themselves and their commanders which enabled them to contest so fiercely the subsequent battlefields."

At Gettysburg (1863), General Buford, in advance of the Union army with two small brigades of cavalry, 2500 strong (dismounted), and a battery of 6 rifled guns, defended the approaches to that field, delaying the advance of a corps of Confederate infantry, who believed that they were opposed to an infantry force. Buford's skill and boldness enabled Reynolds's corps to reach the field in time to secure the advantage of position for the Union army. The Comte de Paris, writing of this affair, says: "This first inspiration of a cavalry officer and a true soldier, decided, in every respect, the fate of the campaign. It was Buford who selected the battlefield where two armies were about to measure their strength." On the third day of the battle an encounter took place between the cavalry of Stuart (6000 sabres) and Gregg (5000), in which the former was thwarted in an effort to gain the rear of the Union line, simultaneously with Pickett's famous charge upon its front. Each cavalry division was accompanied by 3 batteries (about 12 guns) and engaged in a series of mounted charges and individual combats with mediæval ferocity, resulting in the withdrawal of the Southern horse and casualties of 10 per cent. of the forces engaged. The nature of the fight was shown when a fatigue party detailed to bury the dead "found two men, who had cut each other down with their sabres and were lying with their feet together, their heads in opposite directions and the blood-stained sabre of each still tightly held in his grip." At another point lay "two men, one a Virginian, the other a Pennsylvanian, who fought on horseback with their sabres until they finally clinched and their horses ran from under them. Their heads and shoulders were severely cut and their fingers so firmly imbedded in each other's flesh that they could not be removed without force." (Miller.) Another typical instance of the value of cavalry trained after 'the American fashion' follows. At Cold Harbor, Va. (1864), during the Wilderness campaign, Merritt's brigade of 800 (regulars and volunteers) Union cavalry were dismounted at the edge of a wood, with orders to hold the position at all hazards. The horses were hidden in a ravine in the rear. One-half of this force was armed with Springfield breech-loading carbines, the other half with Spencer magazine carbines; all had pistols and sabres. Behind a barricade of fence-rails, carbine in hand and ammunition by his side, each cavalryman awaited the enemy. Soon after, the head of an infantry force (McLaw's Confederate division) was discovered moving through the woods in column of companies, armed with Austrian muskets and sword bayonets. They advanced unsuspectingly until within one hundred yards, when a volley from the cavalry met them. The incessant fire from the magazine carbines made a terrific noise, set the woods on fire, killed and wounded many of the enemy, threw them into confusion, and, believing themselves in the presence of a superior infantry force, they fell back out of range. This delay enabled Grant to occupy the ground upon which was fought the great battle of the following day. The Civil War contains numerous examples of brilliant cavalry operations which have served to place the names of Sheridan, Buford, and Stuart by the side of Seydlitz and Ziethen on the cavalry roll of fame.

In 1866 the 'Seven Weeks' War' between Germany and Austria was too brief to furnish any new cavalry lesson. One or two brilliant actions occurred; at Benatek, where a squadron of Prussian hussars surprised a Hungarian battalion as it emerged from a wood and captured a flag, 16 officers and 665 men, and at Tobitschau, where three Prussian squadrons attacked batteries in position and captured 16 guns. The greater war between France and Prussia (1870-71) was distinguished for the excellence of the German mounted scouts and the failure of the French cavalry. Three famous charges equally desperate (one French, two German) against the enemy's infantry marked this war. That of the French failed, but the Germans were successful, although the French formations remained intact. The cavalry casualties were very heavy. The German cavalry was inferior to the French in fire action, and the Uhlans were powerless in presence of the 'Franc-tireurs' (Home Guards). At Vitray a whole Prussian cavalry brigade was detained for 12 hours by 12 Chasseurs d'Afrique armed with carbines, who by dexterous dismounted tactics successfully posed as infantry. In 1877-78 the war between Russia and Turkey was comparatively barren in cavalry results, if we except the famous Balkan expedition under Gurko. The Spanish-American War (1898) was uneventful from the mounted point of view. The South African War and the operations in the Philippines have shown how important and indispensable a well-mounted and trained cavalry is. The theoretical views as to the disappearance of cavalry in face of modern firearms have vanished. The influence of the South African War of 1899-1902 on the future organization, equipment, and employment of cavalry will be found treated under Mounted Infantry.

THE CAVALRY OF TO-DAY.

The condition of this arm of service in the principal nations of the world (1901-02) may be summarized as follows:

Austria has 42 regiments of regulars (15 dragoon, 16 hussar, 11 Uhlan) and 1 squadron bodyguard—47,490; all are light cavalry. Arms: sabre and repeating Mannlicher carbine. Each man carries water bottle and 2 ammunition pouches. Total weight carried by horse, 297 pounds. There are 3 remount depots; peace effective, 78,000 horses and mules; imperial resources, 3,500,000 animals. On mobilization, 250,000 horses would be required.

Belgium, 8 regiments; total, 6140.

Brazil, 16 regiments.

Bulgaria, 23 squadrons.

Chile, 4 regiments.

Denmark, 5 regiments—1300 (peace), 2650 (war).

Egypt, 10 squadrons—1100. Arms: lance (front rank), sabre, and Martini carbine. Seven squadron leaders are English.

England, 31 regiments regular (5 heavy, 13 medium, 13 light)—20,257. Regiment consists of 4 squadrons of 3 or 4 troops each. Household regiments are of 24 officers, 430 men, 275 horses. Line regiments (home), 26 officers, 696 men, 465 horses and mules; (India), 29 officers, 624 men, 592 horses. Arms: Lee-Metford carbine, sword; also lance in lancers and front rank of dragoons. Total weight carried by horse, 252 to 276 pounds. The Yeomanry (volunteer horse), 10,000, largely recruited from young farmers. In Great Britain and Ireland about 3,000,000 horses, of which 70,000 are fit for military purposes; about one-fifth of these are registered. The Anglo-Indian cavalry consists of 40 regiments (native), 25,400—besides the 9 regiments (British) already mentioned. Each regiment consists of 4 squadrons, 10 British officers, and 625 natives (all ranks). India supplies its own horses.

France has 89 regiments (13 cuirassiers, 31 dragoons, 21 chasseurs, 14 hussars, 6 chasseurs d'Afrique, 4 Spahis)—76,121 (all ranks). About 5 squadrons (145 to 155, all ranks) to each regiment. Arms: sabre and magazine carbine (also lance for dragoons); sabre and dynamite cartridge on saddle, carbine over shoulder. Cuirassiers wear cuirass weighing 13 to 16 pounds. Horses required on mobilization (all arms), 480,000, and deficiency of 25,000 anticipated. There are numerous remount depots.

Germany has 93 regiments (12 cuirassiers, 2 Saxon 'heavy,' 23 lancers, 2 Bavarian 'medium,' 28 dragoon, 20 hussar, 6 'light horse'); each 5 squadrons, 5 officers, 150 men; total, 69,452. Arms: non-commissioned officers, lance, sword, and revolver—privates, lance, sword, and carbine: 30 rounds in pouch, 15 in wallet; carbine carried in bucket on off side of saddle. Horses available (peace), 70,000.

Greece has 3 regiments (12 squadrons), about 1000 men. Arms: Gras carbine and sword.

Italy has 24 regiments, each of 6 squadrons and a depot (4 'heavy,' 6 'light' lancers, 14 light cavalry)—24,760. Arms: carbine, bayonet, long sword; the first 10 regiments carry a 9 foot 9 inch lance. There are about 750,000 horses and 300,000 mules in Italy. The cavalry in peace requires 23,000.

Japan has 7 regiments of 3 squadrons—3000.

Mexico, 14 regiments and 4 skeleton regiments—634 officers, 6738 men.

Norway, 10 squadrons.

Portugal, 8 regiments—276 officers, 4020 men.

Russia's regular cavalry consists of 68 regiments and 2 independent divisions of 2 squadrons (4 guard cuirassiers, 6 guard light cavalry, 54 line dragoons); the cuirassier regiments are 4 squadrons, the others, 6 squadrons. Each regiment (peace), 816-1143; (war), 708-1015; to each will be attached 1 officer, 16 men trained for scouting and courier duty; also another detachment 2 officers, 16 men for pioneers and signal duty. Arms: curved sword, rifle, and bayonet; the rifle slung over shoulder—is similar to infantry rifle. Each man carries 40 rounds. Saddle packed with two 'wallets,' forage-sack, cloak, intrenching tool, picket pin, spare horseshoes, canvas water-bucket, etc.; total weight carried by horse (exclusive of rider), 119 pounds. The Cossacks number (peace), 52 regiments or 317 squadrons; or (war), 148 regiments and 53 independent squadrons—905 squadrons in all; strength of regiments varies from 660 to 1100 (all ranks). Arms: sword without guard, rifle, and (front rank) lance—except Kuban Cossacks. Each man carries 2 bandolier pouches, containing 40 rounds; only snaffle bridle and light saddle-tree resting on felt pads. Weight carried (exclusive of rider), 97 pounds. The aggregate (peace) strength of the Russian cavalry is 5600 officers, 141,936 men. The number of horses available is 23,000,000; required in war by all mounted troops estimated at 450,000. On mobilization, 83 squadrons of Imperial militia cavalry may be called out.

Servia (peace), 1200 men and horses. Arms: Mauser carbine and sword. War strength about double.

Spain has 42 regiments (28 line, 14 reserve) with special squadrons, etc., an effective total of 1232 officers, 12,388 men. Arms: 7 millimeters carbine and sword; 8 regiments carry lances.

Sweden has 8 regiments (3 bodyguard, 5 line)—232 officers, 4977 men.

Switzerland has no standing army, but provides a permanent corps of instructors, 15 being authorized for cavalry militia instruction. In war, the cavalry force first mobilized is estimated at 3608, armed with Mannlicher carbine and sword.

Turkey has (war) 197 squadrons—31,323 (all ranks). Arms: carbine and sword. The 'Hamidieh' (militia) cavalry is organized under tribal leaders and officered by officers of the regular army.

The United States regular cavalry consists of 15 regiments of 3 squadrons of 4 troops; each troop (war), 100 non-commissioned officers and privates; aggregate strength of regiment (peace footing), 1096 (all ranks). Arms: carbine (Krag-Jorgensen), sabre, and revolver. Saddle

(McClellan) packed with blanket, greatcoat rolled, side lines, picket-pin, canteen, meat-can, knife, fork, and spoon, forage-sack, spare shoes, etc.

In the last thirty years Russia has increased her cavalry by 212, Austria by 105, France by 70, and Germany by 21 squadrons.

BIBLIOGRAPHY. For additional information on the history and organization of cavalry the reader may be referred to a number of works. Those of a popular character, which can be recommended, are: Jerram, *Armies of the World* (London and New York, 1900); Wood, *Achievements of Cavalry* (London, 1897); Roemer, *Cavalry: Its History, Management, and Uses in War* (New York, 1863); Dodge, *Riders of Many Lands* (New York, 1894); and the various issues of *The Journal Military Service Institution* (Governor's Island, N. Y., 1885-1901). Other works of a more technical nature are: Oman, *Art of War in the Middle Ages* (London, 1885); von Bismarck, *Tactics of Cavalry* (London, 1827); Nolan, *Cavalry: Its History and Tactics* (London, 1860); Brackett, *History of the United States Cavalry* (New York, 1865); French, *Cavalry in Modern War* (London, 1884); Hohenlohe-Ingelfingen, *Conversations on Cavalry* (London, 1897); Wagner, *Cavalry Studies from Two Great Wars* (Kansas City, 1896); De Brack, *Cavalry Outpost Duties* (New York, 1893); *Journal United States Cavalry Association* (Leavenworth, Kan., 1890-96); *Military Notes—Division Military Information* (Adjutant-General's Office, Washington, 1901). The part played by cavalry in the organization of a modern army will be found treated fully in the article ARMY ORGANIZATION, which should be read in this connection. The use of the arm in modern military operations and the general tactics under which it operates are discussed under TACTICS, MILITARY, where a section is devoted to the tactics of cavalry. See also ARMIES.

CAVALRY AND LIGHT ARTILLERY SCHOOL, UNITED STATES. A practical school of application for officers of the cavalry and light artillery arms of the United States Army. The curriculum of the school includes all that pertains to the art and science of war, so far as regards the cavalry and artillery. Improvements in equipment and tactics, or the application of new principles affecting either branch of the service, are here tested, reported upon, and formulated to the army at large. It is to the officers concerned what West Point is to the cadet. The school is located at Fort Riley, Kan., and is governed by special regulations of the War Department. Included in the school proper is a subschool of practice for both cavalry and light artillery, the troops stationed there consisting usually of not more than three squadrons of cavalry and five batteries of artillery; the personnel is still further augmented by the addition of such other officers and enlisted men as may be there assigned for instruction. The commandant is required to be a colonel of cavalry, but in his absence the next senior officer of either arm may command. The director of the subschool for cavalry is the senior officer of cavalry present: and similarly the senior officer of artillery performs the duties of director of the artillery subschool. The staff of the school consists of the commandant and all field officers of artillery and cavalry present at the post. According to a general order issued June 25, 1902, these regulations were supplemented as follows: The commanding officer of the battalion of field artillery, and the captains of the batteries of field artillery stationed at the post, constitute a board known as 'The Field Artillery Board,' to which may be referred, from time to time, all subjects concerning the operations of artillery in the field, upon which the commanding general of the army may desire its opinions and recommendations. The adjutant of the artillery subpost acts as recorder of the board.

CAVALRY SCREEN. One of the most important duties of cavalry is to obscure and cover the designs or direction of the army for which they are acting as a screen. A regiment of cavalry thus employed would be from 8 to 15 miles in advance of the main army; three squadrons in advance, and one in support. The success of the German troops during the war of 1870 was greatly facilitated by the conspicuous efficiency of the Uhlan cavalry in this particular branch of cavalry service. See ADVANCE GUARD; and TACTICS, MILITARY.

CAV'AN. An inland county in the south of Ulster, Ireland (Map: Ireland, D 3). It lies in the narrowest part of Ireland, 20 miles from the Atlantic, and 18 miles from the Irish Sea. Area, 746 square miles. About three-fourths is arable, and considerable quantities of grain are produced. Of minerals, Cavan affords coal, iron, lead, and copper, and there are many mineral springs. Agriculture forms the chief industry, but linen is manufactured to a considerable extent. The capital is the little town of Cavan. Population, in 1841, 243,260; in 1851, 174,260; in 1891, 111,917; in 1901, 97,350.

CAVANILLES, kä'vå-nē'lyâs, ANTONIO (1805-64). A Spanish historian and jurist. He was born at Corunna, and was educated at Alcalá. His greatest work is the *Historia de España* (1861-63), a history of Spain to the reign of Philip II. It combines conciseness and clearness with eloquence of diction and is ranked among the best works of its kind.

CAVATINA, kä'vå-tē'nå (It., short air, arietta). A vocal, generally an operatic, air, usually sentimental in character and differing from the aria (q.v.) in consisting of one division only and in maintaining the same tempo throughout. *Salut demeure* in Gounod's *Faust* is a familiar example of a cavatina.

CAVAZZOLA, kä'vå-tsō'lå, PAOLO (properly PAOLO MORANDO) (1486-1522). An Italian painter, the peculiar representative of the Veronese school. His manner is simple and dignified, his coloring often vivid. His works include "Christ and Thomas," "The Crown of Thorns," and "The Descent from the Cross" (all in the museum in Verona).

CAVE, or **CAVERN** (OF. *cave*, *caive*, from Lat. *cavea*, cave, from Lat. *cavus*, hollow, Gk. *κύαρ*, *kyar*, hole, from *κύειν*, *kyein*, to swell, to contain). A hollow place in the earth's crust. Aside from the subterranean excavations made by man, caves are produced by the fracture and dislocation of strata during periods of upheaval, by the action of water, or by both causes combined. The eroding and dissolving power of water has formed caverns along river-courses and on seacoasts. The moving waters enter natural crevices and enlarge them by the abrasive action of the suspended sand and gravel. or they attack the softer portions of the strata and form cavities that are inclosed by the more indurated rock. Wave-action is a prominent agency in this process. Caves most frequently occur in limestone regions. where they are usually the result of the solvent action of water and the contained chemical agents, such as carbon dioxide and humic acid. The surface waters in percolating downward through the joint fissures and along the planes of stratification enlarge the channels by solution. Rivers sometimes plunge into the caves through openings known as *sink-holes.* In some limestone regions, as portions of Kentucky and Florida, these holes are a marked surface feature. Many caves are of enormous size. The celebrated cave of Franconia in Germany, that of Kirkdale in Yorkshire, the Mammoth Cave (q.v.) of Kentucky, and Luray Caverns of Virginia, as well as many others. are well known. Rock formations containing beds of salt, a material easily removed by water, may also abound in caverns. They are also frequently met with in igneous rocks—the picturesque cave of Fingal, in Staffa, is formed in basalt; and in South America and Iceland the recent lava contains large caverns.

Many caverns have a calcareous incrustation lining their interior. giving them a gorgeous appearance. Sometimes this deposit is pure white, and has, when the cave is lighted up, a richness and transparency that cannot be imagined. It is, however, more generally colored by the impurities which the water has taken up from the superincumbent strata. To the incrustations which are suspended from the roof, like icicles. the name *stalactite* is given, while those rising from the floor are designated *stalagmites.* Sometimes the pendent stalactite is produced so as to meet the ascending stalagmite and form pillars, as if to support the roof, as in the 'organ' in the Blue John Mine, Derbyshire, and the columns of the Mammoth Cave. The source and origin of this deposit has been satisfactorily explained by Liebig as follows: "The mold of the superficial soil, being acted upon by moisture and air, evolves carbonic acid, which is dissolved by rain. The rain-water thus impregnated, permeating the calcareous strata, has the power of taking up a portion of the lime, which it retains in a liquid condition, until from evaporation the excess of carbonic acid is parted with, when the lime again returns to its solid state, and forms the incrustation."

Caves have an additional interest to the geologist, from the occurrence in many of animal remains under the calcareous incrustations of the floor. The bones are imbedded in mud, and frequently concreted into a firm calcareous breccia. They belong to the Pleistocene period, when the caves apparently were inhabited by large hyenas and bears. Portions of other animals inhabiting the neighborhood were dragged by these into their dens to serve as food. In this way the bones of herbivorous and other animals are found mixed with those of the beasts of prey; they have a broken and gnawed appearance, similar to that produced on recent bones by the teeth of a hyena. No less than thirty-three species of mammals and five species of birds have been discovered in the caves of the British islands, of which number about half still survive in Europe, while the remainder are extinct. The mammals are species of ox, deer, horse, wolf, dog, hare, fox, weasel, water-rat, mole, bat, hippopotamus, and rhinoceros, besides the hyena and bear; and the birds are species of lark, partridge, pigeon, goose, and crow. In the Causses region of southern France there are many caves in Jurassic limestone containing bones of the cave-bear and of human beings, and implements. The most productive bone-cave in Britain is that of Kirkdale, 25 miles from York, in which the remains of about 300 hyenas have been detected, besides innumerable gnawed bones of other animals on which they have preyed. The Carboniferous limestones of Glamorganshire abound in caves which have been explored by Buckland, and more recently and thoroughly by Dr. Falconer. Ossiferous caves occur in all parts of the globe. The fossils of those in Australia show that the fauna of the Pleistocene period had a remarkable resemblance to that of the present day. The remains consist chiefly of kangaroos and allied genera of marsupials. In Colorado, near Colorado Springs, the bones of the goat, antelope, and woodchuck have been found in limestone caverns. The average temperature of some caves is so low that ice remains throughout the entire year. Consult: Badin, *Grottes et cavernes* (Paris, 1870); Hovey, *Celebrated American Caverns* (Cincinnati, 1882); Browne, *Ice Caves of France and Switzerland* (London, 1865).

CAVE, Alfred (1847—). An English clergyman and educator, born in London. He was educated at New College there, held pastorates at Berkhampsted and Waterford from 1872 to 1880, and in the latter year was appointed professor of Hebrew and Church history in Hackney College. In 1882 he was appointed principal of the same institution, where he is also professor of theology. He was vice-chairman of the London Board of Congregational Ministers in 1888 and 1898. He published *Scriptural Doctrine of Sacrifice and Atonement* (1877); *The Battle of the Standpoints* (1890); and *The Spiritual World* (1894).

CAVE, Edward (1691-1754). The founder and editor of the *Gentleman's Magazine,* the first literary journal of its kind ever published. He was born at Newton, in Warwickshire, was educated at Rugby, and became a printer's apprentice. For a time he held a Parliamentary clerkship, and from the information gained through his official position he furnished country news to a London newspaper and weekly news letters to country papers. In 1727 he and Robert Raikes were fined and imprisoned for breach of privilege. In 1731 he was able to set up a small printing-office, and established the *Gentleman's Magazine,* which he conducted the rest of his life, and which is still published. Dr. Johnson was among the early contributors to the magazine, and Cave published several of his earlier works, including *Irene* and the *Life of Savage.* Cave began, in 1732, the publication of a regular series of the Parliamentary debates of both houses, Johnson writing many of the speeches reported in the series.

CAVE, William (1637-1713). An English clergyman and scholar. He was born at Pickwell, Leicestershire, studied at Cambridge, and held various ecclesiastical appointments, among them the rectory of Allhallows the Great, London. His fame rests on his voluminous writings on Church history, the most important of which are: *Primitive Christianity* (1672); *Lives of the Apostles* (1676); *Lives of the Fathers* (1677); and *Scriptorum Ecclesiasticorum Historia Literaria* (1688-98), which were once standard works.

CAVE ANIMALS. A name given to a peculiar assemblage of animals living in the total darkness of caverns. Cave animals usually differ from their epigæan or out-of-door allies in being blind, and either partially or totally eyeless; in having the loss of sight compensated for by greatly developed feelers and other appendages, or by tactile hairs, and in being whitish or colorless, the coloring matter or pigment in the skin having undergone degeneration.

CAVE FAUNÆ. The richest cave faunæ occur in southern France, in limestone deposits near or at the base of the Pyrenees, though the great grotto of Adelsberg, near Triest, is the classic abode of cavernicolous forms, including the blind triton, eyeless beetles, etc. In North America Mammoth and Wyandotte caves, with many smaller ones in their vicinity, as well as the caves in Carter County, Ky., also Weyer's Cave and the Luray Caverns in Virginia, have been especially explored, and have yielded a most varied and interesting fauna. These regions have been honeycombed by the action of subterranean streams now mostly dried up. With these systems of subterranean drainage are associated sink-holes, and deep, dark wells inhabited by blind fish, crayfish, and other crustacea of the same species as those inhabiting the caves. Other caves more or less tenanted by blind forms are situated in Mexico, at Cacahuamilpa, in open sinkholes in Cuba, as well as in caves and wells in New Zealand. The caverns inhabited by permanent assemblages of blind animals both in America and Europe lie south of the ice sheet of the glacial period. The cave fauna probably became established at the beginning of the Quaternary epoch — i. e. very soon after the close of the Tertiary period.

Taking the Mammoth Cave as the type of a great system of underground passages and chambers, let us consider the conditions under which these blind animals live. The total length of the avenues is about 150 miles. In the older and dry passages and chambers there is little life; the animals are mostly congregated in the newer or comparatively damp places, the aquatic forms living in the streams and pools. There is no vegetation, except a few scattered molds and fungi. The food is scanty, and the animals are all carnivorous, preying on one another. The temperature is very equable, the mean for the winter months being 53° F., and for the summer 54° F., the variation throughout the year being scarcely more than one degree.

The number of species thus far detected in Mammoth Cave is about seventy-five, and in other American caves about forty or fifty more, while there are several hundred kinds existing in European caverns.

BLIND FISHES. The most striking and interesting form in Mammoth Cave is the blindfish (*Amblyopsis spelæus*). It is about four inches long, pale or colorless, blind, the eyes being vestigial. According to Prof. C. H. Eigenmann, who has made the latest and most thorough studies on this and other blind fishes, Amblyopsis seeks the dark and shuns the light. A ray of light or a lighted match will cause them to dash away, and bright sunlight appears to be irritating; if exposed to it, the fishes swim about uneasily. In well-fed adult specimens there is no external indication of an eye; but in young ones, before reaching a length of two inches (50 mm.), the eyes can be distinctly seen, owing to their pigment, which is lost in the adult. The optic nerve can be traced in examples under an inch (25 mm.) in length, but in larger specimens "it is no longer possible to follow the nerve to the brain." In only one instance could Eigenmann trace the nerve into the brain-cavity. The lens is much reduced, and, in fact, the vestiges of the eyes are exceedingly variable, "in striking contrast to the condition in normal fishes" (Eigenmann). This will apply to the eyes of other blind fishes and blind insects, crustacea, etc. While the sense of sight is lost, that of touch in the blind fish, as in most other cave animals, is exalted. Amblyopsis is provided with series of tactile papillæ, arranged in ridges on the front and sides of the head. Though the ears of this blind fish are said by Wyman to be largely developed, Dr. Sloan, who kept several of these fishes in an aquarium for twenty months, states that they "manifested total indifference to light and sound." They are said to show in their movements extreme timidity and caution. Eigenmann has proved that, contrary to early views, Amblyopsis is not viviparous; the eggs, however, are laid by the female under her gill-membrane, and the breeding period extends at least from the first of March to November. The young feed on minute crustaceans and other microscopic animals, and the older ones feed greedily on the blind asellus (Cæcidotæa). Like all other cave animals, the body is colorless, and the blind fishes glide through the aquatic shades like "white aquatic ghosts." There are four other species of blind fishes, and with Amblyopsis is associated *Typhlichthys subterraneus*, which lives in caves east of the Mississippi, while *Typhlichthys rosæ* inhabits caverns west of this river.

Subterranean Salamanders.—A still higher type of vertebrate, two species of salamanders, have become adapted to cave life, losing their eyesight by disuse. The species of the genus Spelerpes frequent damp, dark situations and the entrance to caves. An allied form (*Typhlotriton spelæus* of Stejneger) is distinctly a cavernicolous as distinguished from a twilight species, and has never been found outside of caves. Its eyes show early stages of degeneration. It inhabits caves in southwestern Missouri, and occurs under rocks in and out of water. Still another salamander, whose eyes are the most degenerate known among amphibians, is the *Typhlomolge Rathbuni* of Stejneger. It lives in subterranean streams, tapped by an artesian and also a surface well, near San Marcos, Tex., and likewise occurs in one of the caves near that town. Its remarkably long and slender legs are too weak to support its body when out of water. The eyes of this salamander are in many respects much more degenerate than those of the Proteus of Austrian caves. It has no eye-muscles, the retina is more reduced, no trace of the lens could be found except in one individual, and no blood-vessels enter the eye, the shape of the eye itself, which lies just beneath the skin, being very variable (Eigenmann).

The Proteus of Adelsberg Cave is a salamander-like form, allied to our mud-puppy (Necturus). It has external gills, very weak legs, ending in three toes in the fore and two in the hinder pair. Its body is remarkably slender, white or colorless, and the eyes are minute, just visible beneath the skin. It is noticeable that when this animal is kept in the laboratory, exposed to daylight, the stimulus of the light-rays causes the pigment to develop so that the skin turns slightly dark.

The lower animals tell the same story of degeneration, blindness and total or partial atrophy of the eye, together with loss of color, and, in a more striking way, the compensation for the loss of vision by a great increase in length of the antennæ and other appendages, or the growth of long, slender tactile bristles.

Blind Crayfish and Insects.—A notable inhabitant of Mammoth and other caves is the blind crayfish (*Orconectes pellucidus*). It differs from its out-of-door allies in being blind, slender-bodied, and colorless. The eyes are present, but they are much reduced in size and destitute of a cornea and of black pigment, while the colorless body is slender. It is not only blind, but deaf, as A. S. Packard discovered that the auditory sacs are a third smaller, and the auditory hairs in the ears also a third shorter and smaller; hence it is to be inferred that the ears of the blind crayfish are degenerate, and the sense of hearing nearly, if not quite, obsolete. This creature is also exceedingly timid and cautious in its movements.

The eyeless beetles of caves (Anophthalmus) have no vestige of eye or of optic nerves and ganglia; but in their movements they closely resemble their epigæan allies. While their bodies and appendages are slender, they grope their way about by means of very long tactile bristles. They act exactly as if enjoying good eyesight. They walk, run, stop to explore the ground, seek their food, and run from the fingers of the insect-hunter who tries to seize them with the same agility as beetles provided with eyes. Other beetles, such as Adelops, which has retained vestiges of the outer eye; some spiders, comprising an eyeless species, and others with eyes varying in size, some much reduced, spin little webs on the walls of the chambers. Among the harvestmen some have extraordinarily long legs; while the Campodea, a wingless insect of the Mammoth and other caves both of the United States and Europe, differs from the outdoor form in its antennæ and abdominal appendages being greatly exaggerated in length. The cave crickets have eyes, but they do not extend into the remoter parts of the cave, and hence are twilight species, and probably cross with other twilight individuals. Besides these, there are many eyeless crustacea of different groups—mites, myriapods, primitive wingless insects, a few flies, worms, and infusoria which go to make up this assemblage of sightless troglodytes.

Origin and History. The fauna of caves is evidently composed of the descendants of individuals which have been carried by various means into the subterranean passages, have become adapted to life in perpetual darkness, becoming isolated, and thus, so long as they are subjected to their peculiar environment, breed true to their species, and show no tendency to relapse to their originally eyed condition. There are, moreover, many blind or eyeless animals, fishes, insects, and crustacea which live in holes, ant-nests, or in the abysses of the ocean, which, from the same general cause—i.e. absence of the stimulus of light—have become eyeless and otherwise modified in compensation for the loss of vision.

The fauna of caves is indeed a most simple and intelligible object lesson in establishing the truth of the evolution theory and the doctrine of use-inheritance. Lamarck, in 1809, cited the cases of the mole and burrowing sphalax, as well as the Proteus of Austrian caves, as examples of the impoverishment and disappearance of these organs through constant lack of exercise. Darwin candidly admitted that natural selection did not operate in the case of cave animals, but that the loss of eyes was due to disuse.

Indeed, the main interest in studies of cave life centres in the obvious bearing of the facts on the theory of descent. The conditions of existence in caverns, subterranean streams, and deep wells are so marked and unlike those which environ the great majority of organisms, that their effects on the animals which have been able to adapt themselves to such conditions at once arrest the attention of the observer.

It is obvious that the action of the Lamarckian or primary factors of organic evolution—i.e. change in the environment and use and disuse—are amply sufficient, when coupled with isolation and heredity, and that form of it called use-inheritance, to produce the blind forms. Here, also, we have a case where the transmission by heredity of eyes adapted for vision lapses, owing to the profound change of environment, and the animals, after becoming adapted to a life in total darkness, inherit the degenerate eyes as well as the specialized tactile organs, elongated appendages, etc., acquired by the modified organisms—a clear example of the transmission of acquired characters. The absence of the stimulus of light causes the eye, through disuse, to undergo reduction and atrophy. With this goes, in certain forms, the loss of the optic ganglia and optic nerves. Packard has found and stated the following effects of disuse in the invertebrate animals of Mammoth and other caves, and it will be realized how profoundly the organisms have been modified:

(1) Total atrophy of optic lobes and optic nerves, with or without the persistence in part of the pigment or retina and the crystalline lens (certain crustacea, harvestmen, Adelops beetle, and the myriapod Pseudotremia).

(2) Persistence of the optic lobes and optic nerves, but total atrophy of the rods and cones, retina (pigment), and facets (blind crayfish).

(3) Total atrophy of the optic lobes, optic nerves, and all the optic elements, including rods and cones, retina (pigment) and facets (Anophthalmus beetle, and the myriapod Scoterpes).

An interesting fact, confirmatory of the theory of occasional rapid evolution, as opposed to invariably slow action involved in pure Darwinism, is that we never find any vestiges of the optic lobes or optic nerves; if they are wanting at all, they are totally abolished. The atrophy is comparatively rapid, sudden, and wholesale. It was probably so with the loss by disuse of the thumb of the thumbless monkey of South America, which has retained no vestige of the lost member.

The varying degrees of development in the external parts of certain blind animals prove that these forms entered the caves at different periods, and have been exposed for different lengths of time to the loss of light. The completely eyeless forms are the oldest inhabitants of these regions of Cimmerian darkness. The imperfect lenses and retinæ, the abolishment of visual nerves and portions of the brain, are, like all vestigial structures in highly specialized or modified animals of various kinds, like ancient, decayed sign-posts pointing out some nearly obliterated paths now unworn and disused.

On the other hand, certain other parts of the body, as the result of use, become extraordinarily developed; such are the tactile papillæ of the blindfish, the greatly lengthened feelers and legs, the long, delicate tactile hairs of various crustacea and insects. It is plainly the case that the enhanced development of these organs is the result of frequent use or exercise. There is no need of invoking natural selection, these parts developing as the direct result of the change of habits, of the new needs of the animals to feel their way about, forced to adopt such habits by the abnormal conditions of their existence. Although the animals are members of very different groups, inheriting very different structures and habits, yet all genuine cave animals resemble each other in being pale, ghost-like, in the exaltation of the tactile sense, and the corresponding increase in length and delicacy of the extremities.

Yet some naturalists of the Neo-Darwinian school reject the operation of the Lamarckian factors and illogically attribute the creation of this wonderful assemblage of blind forms to natural selection, and others to panmixia—i.e. the cessation of natural selection.

Balance of Theories.—In his elaborate work on the eyes of blind fishes Eigenmann fully and candidly discusses the conflicting views, and concludes as follows: "The Lamarckian view, that through disuse the organ is diminished during the life of the individual, in part at least on account of the diminution of the amount of blood going to a resting organ, and that this effect is transmitted to succeeding generations, not only would theoretically account for unlimited progressive degeneration, but is the only view so far examined that does not on the face of it present serious objections."

It would be a thorough test of the theory of descent if we could keep these creatures in confinement, exposed first to twilight and then to the full light of day, and endeavor to breed a series of generations of these blind animals and ascertain whether their descendants would not revert to their original ancestral eyed forms.

Fortunately, an underground laboratory for the study of cave animals has been established by M. Viré in the old catacombs and underground quarries extending under the Jardin des Plantes in Paris. Here are all the conditions of a cave, viz. perpetual darkness, an unvarying temperature, and running water for aquatic forms. M. Viré has introduced various blind or eyed species, and eventually we may expect to have much light thrown on the interesting problems suggested by such studies as these.

Great activity has been shown in France in the exploration of the caves and subterranean streams of the Midi. A Société de Spéléologie has been organzied for several years.

Consult: A. S. Packard, "The Cave Fauna of North America" (*Memoirs National Academy of Sciences*, Vol. VI, many plates, Washington, 1888); C. H. Eigenmann, "The Eyes of the Blind Vertebrates of North America" (*Archiv für Entwickelungsmechaniks der Organismen*, VIII., 1899); and other papers. See also the writings of Tellkampf, Schiödte, Cope, Putnam, Garman, Henshaw, Joseph, Chilton, and others.

CA'VEAT (Lat., let him beware, from *cavere*, to take heed). A formal notice addressed to a judicial or administrative officer, warning him not to take certain proceedings, which may or may not be in contemplation, without first giving due notice to the person filing the caveat. The object of the notification is to secure to the person giving it an opportunity to be heard in opposition to the action or proceeding in question, and it operates as a stay upon such proceeding. Caveats are available in England for a variety of purposes, as to restrain the enrollment of a decree in chancery, the issuing of a lunacy commission, the grant of a marriage license, the probate of a will, etc. In the United States they are not so common, though they may in some States be employed for some of these purposes, especially to stay the probate of wills and the issuing of letters testamentary.

The laws regulating the granting of patents in the United States, however, provide that a caveat may be filed by an inventor to give notice to the Patent Office of inchoate inventions. Such a caveat must set forth the purpose of the invention or discovery, and its distinguishing characteristics; and it prays protection of the inventor's right until he shall have matured his invention. It is required to be filed in the confidential archives of the office and to be preserved in secrecy, and it must be renewed from year to year in order to be kept in force. The person filing it is entitled to be notified of any application for a patent made during the lifetime of the caveat, which application, if granted, would interfere with the invention claimed therein, and is entitled to priority by reason thereof. See PATENT. Consult: *Rules of United States Patent Office;* Merwin, *Patentability of Inventions* (Boston, 1883); Luby, *Patent Office Practice* (Kalamazoo, 1897).

CA'VEAT EMP'TOR (Lat., let the buyer beware). The common-law maxim signifying that the purchaser of land or goods takes his chances as to the title or the quality of the property acquired by him. There is great difference of opinion as to the extent to which this maxim really represents the law. A learned English judge expressed the opinion, in 1849, that "the result of the older authorities is that there is by the law of England no warranty of title in the actual contract of sale, any more than there is of quality." A few years later an equally learned judge declared that "the only semblance of authority for this doctrine from the time of Noy and Lord Coke consists of mere dicta." The application of the doctrine to title has been done away with in England by the Sale of Goods Act, 1893 (56-57 Victoria, c. 71), by which the law relating to the sale of goods was codified, while in the United States this application of the doctrine has never had any judicial sanction, so far as the sale of personal property is concerned. The mere act of A's selling property to B amounts to an undertaking on his part that the title was in him. B does not buy at his peril. It is the seller, not the buyer, who must take care of the title. However, the maxim 'Caveat emptor' does apply to sales of land. In the absence of fraud or of covenant as to title by the vendor, the vendee buys at his peril.

With respect to the quality of chattels, the common-law maxim 'Caveat emptor' still applies, although its scope has been narrowed greatly during the last hundred years. Indeed, an eminent judge has declared that the exceptions have well nigh eaten up the rule. By the English Sale of Goods Act referred to above, the civil-law rule 'Caveat venditor' (let the seller beware) is in many cases substituted for 'Caveat emptor.' For example, if the buyer notifies the seller that the goods for which he is treating are required for a special purpose, and that he relies on the seller's skill or judgment, and the goods are of a description which it is in the course of the seller's business to supply, the seller impliedly engages that they shall be reasonably fit for such purpose. Again a person who sells goods by description (as Manila hemp) impliedly engages that they shall correspond with the description and shall be of a merchantable quality. While neither legislation nor judicial decisions in the United States accord entirely with the provisions of the English statute, their tendency is toward the same goal.

In Rome the rule of early law was, in effect, 'Caveat emptor.' With the growth of commerce, however, the inadequacy and injustice of this rule became apparent, and it was modified from time to time by ædilician edicts and by the reasoning of jurists, until it was transformed into 'Caveat venditor.' This maxim of primitive law has been undergoing a similar modification in England and in the United States during the last century. Consult the authorities referred to under SALES; TITLE; and WARRANTY.

CAVEDONE, kä'vе-dō'nȧ, GIACOMO (1577-1660). An Italian painter. He was educated in the school of the Carracci, and was a workman under them in the churches of Bologna. His chief productions are "The Adoration of the Magi;" "The Four Doctors;" "The Last Supper;" and "The Virgin and Child in Glory," now in the Bologna Gallery. He was at one time an assistant to Guido Reni, in Rome.

CAVE-DWELLERS. A general term, usually, but loosely, applied to a largely hypothetic class of troglodytes, or primeval inhabitants of given countries or of the world. The most decisive evidences of cave life by early man are derived from western Europe, both continental and insular, where human remains and artifacts are found in certain caverns associated with bones and teeth of various extinct animals, including the cave-bear, the sabre-toothed tiger, etc., as well as of animals no longer occupying the same habitat, such as the reindeer, hyena, etc. As shown by Buckland in the Eighteenth Century, such remains are frequently found in a distinctive earthy deposit ('red cave earth') beneath a floor of stalagmite. The sequence of deposits and the character of the fossils attest great antiquity, probably antedating the later glacial periods of the Pleistocene. Several of the most instructive examples of early prehistoric man (Man of Spy, Man of Cro-Magnon, Man of Mentone, etc.) may be regarded as representing the period of European cave-dwellers. In various parts of the world, notably in Asia and southeastern Europe, are found habitations excavated in cañon-walls or other precipices; the rock-hewn tombs at Petra, in northern Arabia, are plausibly supposed to have been designed as places of residence; in China and Mongolia whole villages are excavated in bluffs of loess, as noted by Pumpelly and others; but nowhere do mankind now occupy natural caves as permanent habitations, so far as known. Many of the Amerinds temporarily occupied natural shelves or niches in precipices ('rock houses,' as they are sometimes called), and some inclosed these with walls of masonry or other material to form permanent cliff-dwellings, while others excavated the cliff-faces to form cavate lodges (see ARCHÆOLOGY, AMERICAN); it is known, too, that individuals and families, or even small bands, found temporary refuge in caverns; yet the term 'cave-dwellers' is inapplicable in America, either as a specific designation for any people or period, or as a descriptive term. The general tendency of recent researches is to show that primeval men were arborean and ararian—i.e. forest rangers and shore-dwellers—rather than cave-dwellers, and that cave life was secondary and due to peculiar conditions rather than primary and characteristic.

CAVELIER, kȧ'v'-lyȧ', PIERRE JULES (1814-94). A French sculptor. He studied under David d'Angers and Delaroche and first gained celebrity in 1849 by a statue of "Penelope," for which he received the medal of honor. In 1865 he became a member of the Institute. Among his works are "Truth," in the Louvre, statues of Abélard and Napoleon, and busts of Ary Scheffer and Horace Vernet.

CAVELIER DE CUVERVILLE, de ky'vâr'vēl', JULES MARIE ARMAND (1834—). A French naval officer. He was born near Allineuc, Côtes-du-Nord, and studied in Rennes and in Paris. He took part in the Crimean campaign, was professor at the Naval Academy from 1861 to 1863, naval attaché of the French embassy at London, and commander of the naval division in the southern Atlantic. After his promotion to the rank of rear-admiral in 1888, he was, in 1890, intrusted with the chief command of the Atlantic squadron, in which capacity he terminated the affair with Dahomey and signed a treaty of peace with the King of that country. His contributions to naval literature include: *Le Canon de quinze pouces des Etats-Unis* (1866); *Progrès réalisés par l'artillerie navale de 1855 à 1880* (1881); *La marine aux Etats-Unis, rapport adressé au président Johnson* (1867).

CA'VEN, WILLIAM (1830—). A Canadian Presbyterian divine. He was born at Kirkcolm in Wigtownshire, Scotland, December 26, 1830, graduated at the theological seminary of the

United Presbyterian Church, Toronto, Canada, 1852, entered the ministry, became professor of exegetical theology and biblical criticism, Knox College, Toronto, 1866, and principal of the college, 1873. He was prominent in the movement which eventuated in the union of the different branches of the Presbyterian Church in Canada.

CAVENDISH, kăv′en-dĭsh *or* kăn′dĭsh. The pseudonym of Henry Jones, who wrote on whist and other games of cards.

CAVENDISH, Frederick Charles, Lord (1836-82). An English statesman, the second son of William Cavendish, seventh Duke of Devonshire. He was born at Compton Place, Eastbourne, November 30, 1836, and graduated B.A. at Trinity College, Cambridge, in 1858. He was private secretary to Lord Granville from 1859 to 1864, and entered Parliament in the following year. After serving as private secretary to Mr. Gladstone (1872-73) he entered the treasury department, in which he was financial secretary from 1880 to 1882, when he was appointed chief secretary to Earl Spencer, Lord Lieutenant of Ireland. He accompanied the latter to Dublin, and took the oath as chief secretary at the castle, May 6, 1882. On the afternoon of the same day, while walking in Phœnix Park with Thomas Henry Burke, under-secretary, he and his companion were assassinated. It was afterwards shown that the plot had been laid against Mr. Burke, and that Cavendish was killed because he was in the company of the under-secretary. Three of the conspirators turned State's evidence, five were hanged, and seventeen were otherwise punished.

CAVENDISH, George (1500-c.1561). An English author, the biographer of Cardinal Wolsey. In 1526 he entered the service of Wolsey and remained his constant friend, in prosperity and adversity, until the end. The *Life of Wolsey*, written in 1557, was first published, in a garbled state, in 1641. The full text first appeared (a small edition) in 1761, and again in 1815. It is one of the volumes in Morley's *Universal Library* (1885). It is a noble work, ranking with the best English biographies.

CAVENDISH, Henry (1731-1810). An English natural philosopher and chemist. He was born in Nice, the eldest son of Lord Charles Cavendish and a nephew of the third Duke of Devonshire. He was educated at Peterhouse College, Cambridge, but left without taking his degree, and devoted his entire life to the study of mathematics and physical science. He inherited considerable means from his uncle and was thus able to gratify his taste for scientific investigation. He was unmarried and lived in quiet retirement, having intercourse with few persons, and having no interests beyond his scientific studies and investigations. His first published work was entitled *Experiments on Arsenic* (1764), but his earliest experiments of interest were on heat, and were not published for a number of years after they were performed. These experiments included the study of the evolution of heat when a liquid is solidified or a gas condensed, as well as an investigation into the subject of specific heats of substances.

The first scientific paper of importance published by Cavendish was on *Factitious Air*, and was communicated to the Royal Society in 1766, while later he undertook the study of carbonic-acid gas, determining its specific gravity and showing that a small amount would so vitiate common air as to make it impossible to support either combustion or life. The most celebrated work of Cavendish was his ascertaining "that water consists of dephlogisticated air (oxygen) united with phlogiston (hydrogen)." One of the most celebrated of the experiments performed by Cavendish was the determination of the density of the earth (*Philosophical Transactions*, 1798), by a method to which his name has been given. This plan had been suggested by the Rev. John Mitchell, and consisted of having a suspended rod with two lead balls at its extremities. When masses of metal were placed near these balls the force of attraction exerted between the masses could be measured. Accordingly it was possible to compute the attraction exerted on a mass the size of the earth and thus determine its density. Cavendish ascertained this quantity to be 5.45, a figure that has been slightly raised by subsequent experiments. Cavendish lived almost in solitude, and died leaving a fortune of £1,175,000. *The Electrical Researches of Henry Cavendish*, edited by J. Clerk Maxwell, were published (Cambridge, England, 1879). Consult Wilson, *Life of Cavendish* (London, 1846). See Chemistry.

CAVENDISH, Margaret, Duchess of Newcastle (c.1624-74). An English writer, born near Colchester in Essex. She was educated at home; became a maid of honor to Queen Henrietta Maria (1643-45); married, in Paris, William Cavendish, afterwards Duke of Newcastle (1645), and lived abroad with him till the Restoration. She died in London, and was buried in Westminster Abbey. The famous inscription on her tomb declares that she belonged to a family of which "all the brothers were valiant and all the sisters virtuous." Her writings, consisting of plays, poems, sketches, letters, an autobiography, and a memoir of her husband, are exceedingly interesting. *Selections* were edited by Lower, in Smith's *Library of Old Authors* (London, 1872), by Jenkins (London, 1872), and by C. H. Firth (London, 1886). Consult, also, Gosse, *Seventeenth Century Studies* (London, 1895).

CAVENDISH, Spencer Compton. See Devonshire, Eighth Duke of.

CAVENDISH, Thomas (c.1555-92). The second English circumnavigator of the globe, and a noted freebooter. He was born in the parish of Trimlay Saint Martin, Suffolk, studied for a brief period at Cambridge, but left without a degree, followed the Court, and soon squandered his inheritance. To repair his fortunes he turned to maritime adventure, and fitted out a ship that accompanied Sir Richard Grenville's expedition to Virginia in 1585. On this voyage he captured three rich Spanish ships. In July, 1586, he sailed from Plymouth with three vessels on a predatory expedition, passed through the Straits of Magellan, cruised along the west coast of South America and Mexico, and burned or sank nineteen vessels, among which was the *Santa Anna*, belonging to the King of Spain, and having an immensely valuable cargo, which he seized off California. He returned to Plymouth September 9, 1588, with his plunder, having gone around the globe in two years and fifty days. When he came home it was said that his seamen were clothed in silk, his sails were of damask, and his topmast was covered with cloth of gold. Within three years he wasted his wealth, and he died on another voyage. Accounts of all three voyages are to be found in Hakluyt.

CAVENDISH, Sir William (1505-57). An English courtier. He was a younger brother of George Cavendish, Cardinal Wolsey's biographer, with whom he is often confused. He enjoyed the favor of Henry VIII., who, in 1530, appointed him one of the commissioners to seize monasteries for the Crown. In 1546 he was made treasurer of the King's chamber, was knighted, and became a privy councilor. Both Henry and Edward VI. largely increased his landed property by grants of monastic estates. Conforming under Mary, he also received rewards from her. His great property became the foundation of the immense estates of the Dukes of Devonshire.

CAVENDISH, William, Duke of Newcastle (1592-1676). An English statesman and author. He was the son of Sir Charles Cavendish, younger brother of the first Earl of Devonshire, and was educated at Saint John's College, Cambridge. His accomplishments and bearing gained him the favor of James I., who, in 1610, made him a Knight of the Bath, and in 1620 raised him to the peerage as Viscount Mansfield. In 1628 he was created Earl of Newcastle by Charles I., and, on the royal visit to Scotland, entertained the monarch with two banquets of historical repute, at a cost of £20,000. In 1638 the King intrusted him with the tuition of his son, afterwards Charles II. He munificently supported the King during the Civil War, and raised a troop of 200 knights, who served at their own cost. As general of the northern forces he had the power to issue declarations, confer knighthood, coin money, and raise men. After the battle of Marston Moor, Cavendish retired to the Continent, where he resided in poverty until the Restoration. On his return he was created Duke of Newcastle. He wrote poems, plays, and veterinary works. *La méthode et invention nouvelle de dresser les chevaux* (Antwerp, 1657) was written in English, translated by a Walloon, and published in French; afterwards it was amplified as *A New Method and Extraordinary Invention to Dress Horses and Work Them According to Nature, etc.* (London, 1667). He was a skillful horse-trainer, and made an accomplished horseman of his pupil, Charles II. He died December 25, 1676. Consult *Life of the Duke of Newcastle*, by his second wife, Margaret Lucas (London, 1667; new edition by C. H. Firth, London, 1886). This work is ridiculed by Pepys in his *Diary*, March 18, 1668.

CAVENDISH COLLEGE. A college founded in 1873 by the County College Association of Cambridge University, England, in order to enable undergraduates to pass through a university course at the least possible cost of money and time, and to make a specialty of the art of teaching. The present buildings of the college were begun in 1876. There were, in 1890, about 33 students in residence. It was closed the following year, and is at present a Nonconformist training college, and, of course, not connected with the university.

CAVE OF ADUL'LAM. See Adullam, Cave of.

CAVE OF MACHPELAH, măk-pē'lȧ. See Machpelah, Cave of.

CAVE OF MAMMON. A subterranean cavern described at length in Spenser's *Faerie Queene.* It is the unpleasant abode of the God of Avarice.

CAVE OF THE NATIVITY. The supposed birthplace of Christ, a winding cave in Bethlehem, beneath the Church of the Nativity, built over it by the Empress Helena and the Emperor Constantine. The position of the manger and the precise spot where Christ was born are marked. The grotto is beautified with marbles and candles are constantly burning.

CAVE OF THE WINDS. See Niagara Falls.

CAVE OF TROPHO'NIUS. See Trophonius.

CAVERNE DE L'HOMME MORT, kȧ'vârn' de lōm môr (Fr., cavern of the dead man). A cave in the Department of Lozère, France, in which skeletons of a prehistoric race have been discovered.

CAVET'TO (It., dim. of *cavo*, hollow, from Lat. *cavus*, hollow, Gk. *κύαρ*, *kyar*, hole, from Gk. *κύειν*, *kyein*, to swell, to contain). In architecture, a simple concave molding, to be distinguished from the scotia (q.v.) because it is only a quarter round, whereas the scotia's curve embraces at least the half of a circle or ellipse.

CAVIANA, kȧ-vyä'nȧ. An island of Brazil, lying across the main mouth of the river Amazon. It is about 35 miles long by 20 wide, fertile, and well stocked with cattle (Map: Brazil, H 3). The little town of the Roberdello, on the southeast coast of the island, is almost exactly under the equator.

CAVIAR, kăv'ĭ-är, or **CAVIARE** (Fr., from Turk. *hāvyār*, caviar, probably of Tatar origin). The roe of a sturgeon prepared as a piquant table delicacy, especially in Russia. (For the various sturgeons, see Sturgeon.) The process of making caviar is as follows: The ovaries, having been removed from the fish, are beaten to loosen the eggs, which are then separated from the muscular tissue by being pressed through a sieve. The liquor is then pressed out, salt is well mixed in, and the whole packed in small kegs. The quality of the result depends upon the care in clearing and drying it. The best is prepared by granulating the roe in linen sacks, which are laid in the brine and then hung up in the sun to dry. The Russian caviar comes principally from the neighborhood of the Caspian Sea; but it is prepared in the Danube provinces and elsewhere, and lately has been made extensively in the western United States.

CAVITE, kȧ-vē'tȧ. The capital of the Province of Cavite, in Luzon, Philippines, on Manila Bay, about 8 miles southwest of Manila (Map: Luzon Island, E 8). It is built of stone, and has a theatre and several Government buildings of note. The leading industrial establishment is a large tobacco-factory. During the Spanish administration Cavite was one of the principal strongholds in the archipelago, and since the Spanish-American War has been made even stronger. There are an arsenal, well-equipped repair-shops, and good docking facilities. Population, in 1898, 1497.

CAVITE. A province of Luzon, Philippines, situated south of the Province of Manila, and bounded by Manila Bay on the west. It covers an area of 488 square miles. It has wooded mountains and well-watered valleys, and is of commercial importance, on account of its advantageous situation. Agriculture receives considerable attention. Its population is estimated as about 134,000.

CAVO, kä′vô, ANDRÉS (1739-c.1800). A Mexican Jesuit historian, born in Guadalajara. He entered the Jesuit Order in 1759, and was sent as a missionary to the Northwest. In 1767 he was compelled to leave Mexico by the decree expelling the Jesuits. He prepared in Rome a work on Mexican history, which disappeared, but was recovered by C. M. Bustamante and published as *Los tres siglos de Méjico durante el gobierno español* (1836). H. H. Bancroft, in his *History of Mexico*, gives an unfavorable estimate of the narrative.

CAVO-RILIEVO, kä′vô rê-lyā′vô (It. *cavo*, hollow + *rilievo*, relief). A kind of depressed bas-relief, where the carving is sunk below the level of the surface of the background. It was used extensively by the Egyptian wall-decorators. It makes possible the execution of sculptured wall-panels after erection of a building in stone or marble, without the trouble of leaving bossed spaces in course of construction.

CAVOUR, kȧ-vo͞or′, CAMILLO BENSO DI, Count (1810-61). The great constructive statesman of modern Italy. He was born in Turin, August 10, 1810, the son of the Marquis Michele Benso di Cavour and Adèle, second daughter of the Count de Sellon of Geneva. As a younger son, Camillo was educated for the army in the military academy in Turin, serving at the same time as a page in the royal household of King Charles Albert. After graduating at the head of his class in 1826, he entered the army as a lieutenant of engineers. Even at this early period he showed the earnestness, concentration, and ability which made the brilliant statesman of later years. He was proficient in the study of mathematics, the languages, and history. His mind was extremely practical, and he never cared for art or romance. He had no taste for military life, and devoted himself while in garrison in the fortress of Bard to the study of economics and English politics. In 1831 he resigned his commission and undertook the management of his father's estate at Leri, in Piedmont. Without any previous knowledge of farming, Cavour soon mastered agriculture in all its details, restored the estate, which had been much neglected, and became a leader in the introduction of progressive methods of agriculture into Piedmont. He ever afterwards loved the work, and found at Leri throughout his life rest from the cares of State. In this occupation and in travel Cavour spent fifteen busy and profitable years. The democratic monarchy of England was always his ideal, and he was a great admirer of Anglo-Saxon liberty. In England he made a thorough study of the political, social, and industrial institutions. In 1847, when the censorship of the press had been abolished in Piedmont, Cavour, realizing the power that this agency might have in the great struggle for which Italy was preparing, established in Turin, with Cesare Balbo and others, a journal, *Il Risorgimento*, which declared for independence, unity, and reform. A moderate Conservative in his views, a stanch supporter of the monarchy, but a constitutionalist, he satisfied the extremists of neither party, and was far from being a popular leader: but his ability, independence, and courage commanded respect. His greatness was in nothing more marked than in the impersonality of his work. In 1848, when Genoa was about to send a deputation to Turin to ask for a civic guard and the expulsion of the Jesuits, Cavour, at a meeting of journalists held to decide on a course of action, declared that the demands of the Genoese were too moderate, and that a constitution was the only remedy for existing evils. This was, for the times, a revolutionary declaration, and especially startling as coming from a Conservative. Cavour had, indeed, been regarded as almost a reactionary, so little was his moderation understood in the passionate politics of the time. Events justified Cavour; in February Charles Albert (q.v.) set his signature to the famous *Statuto*, the Constitution of Piedmont around which, under Cavour's leadership, all the advocates of Italian liberty and unity gradually rallied. He entered Parliament in 1848, a pronounced advocate of a free and united Italy. This platform was sufficient for him during his whole career. He never separated the two ideals, and he decided at the outset that they could be attained only under the royal House of Savoy. He never sympathized with Mazzini and the Republicans, whose theories he believed ill adapted to Italian conditions. On March 7, 1850, Cavour, speaking on the proposition to abolish the special jurisdiction of the ecclesiastical courts, declared that by persevering in her reform policy Piedmont would be "gathering to herself all the living forces in Italy, and would be in a position to lead the mother country to those high destinies whereunto she is called." This expression of an aggressive national Italian policy brought Cavour into still greater prominence, and upon the death of the Count of Santa Rosa he was called into the Cabinet, then headed by Massimo d'Azeglio (q.v.), at first as Minister of Agriculture, then as Minister of Commerce and of the Marine. He now gave up his journalistic connections, and entered upon his great career as a State-builder. He also disposed of all his holdings in agricultural and industrial companies. In April, 1851, he was made Minister of Finance, and in the same year, having already become the dominating force in the Ministry, he made the famous alliance with Urbano Rattazzi (q.v.), leader of the Left Centre, by which the two parties of the Centre united in support of the Ministry, in opposition to the Extreme Right and the Extreme Left. It was through this union of moderate parties that Cavour proposed to foster the new Italy. He was never a party man, and looked only to the good of the State. The compact with Rattazzi, known as the *connubio*, was discountenanced by d'Azeglio, and led to a rupture in the Cabinet (April 15, 1852). Cavour retired temporarily from office, and went to France and England, to find out how the *connubio* was regarded among those whose aid he hoped to obtain in realizing Italian aspirations. He was reassured by his reception in both countries; but he made up his mind that, of the two, it was France that must be looked to for active support in establishing the new Italy as against Austria. He therefore devoted his energy to winning the man who was then directing the destinies of France—the new Emperor Napoleon. A ministerial crisis occurred on his return to Piedmont, and Cavour became the head of the Government, holding the posts of Minister of Finance and president of the Council. He gave his immediate attention to the material development of the kingdom, the rehabilitation of its finances, and to various reforms, such as the legalization of civil marriage, the suppression of the mendicant orders, and the encouragement of secular education. In 1854 he saw, in an alliance with France and England against Russia, an opportunity to bring Sardinia into the councils of Europe. He brought about the alliance, in spite of the opposition of every one in the country excepting the King and the ministers. Ten thousand troops of the reorganized Sardinian Army were dispatched to the Crimea. It was a dangerous game, and might have failed but for the fatuous policy of Austria, upon which Cavour had counted. The Sardinian contingent won the respect of their allies. Austria's weak course destroyed her primacy in Continental affairs, and at the Congress of Paris (see PARIS, CONGRESS OF), in 1856, Cavour accomplished his great object in compelling the representatives of the Powers to admit Sardinia to their councils and to take up the condition of Italy for international consideration. At the congress Cavour stood for the aspirations of Italy, and while he gained nothing directly for Sardinia, he secured recognition as an Italian leader, which he desired more. It was Italy, rather than Sardinia or Piedmont, of which he always spoke and thought. While these events were passing he was also engaged in a struggle with the Church over the disestablishment of the religious orders.

The Congress of Paris left the issue between Austria and Sardinia very sharply defined, and made war almost inevitable. Cavour's energies were devoted to preparing for the struggle. He increased taxation, but developed the resources of the country to meet the new burdens. In 1858 he severed political relations with Rattazzi, who supported the King in the affair of the Countess Mirafiori. (See VICTOR EMMANUEL I.) After the unsuccessful attempt of the Italian fanatic Orsini upon the life of Napoleon III., the secret meeting at Plombières was held between the French Emperor and Cavour (July, 1858), at which the agreement was made which was to bring France to the side of Italy in the contest with Austria. Cavour's masterful diplomacy is well illustrated in connection with the Austrian War. To the Englishman, Mr. Odo Russell, who did not believe Austria would be so unwise as to declare war, Cavour said, in the spring of 1859, that he would force her to do so, and named the first week in May as the time. A few days before that time Austria had actually committed the desired indiscretion. The royal speech to Parliament, January 10, 1859, prepared by the King, but revised by Cavour and Napoleon III., voiced the spirit of united Italy against the foreign oppressor. Napoleon hesitated on the verge of war, and sought to have a congress held, and England proposed that all the Italian States should be admitted; but Austria lost its chance of retaining its hold on Italy by refusing to accede to the English proposal, and demanding the unconditional disarmament of Sardinia. Austria's offensive ultimatum to Sardinia left no alternative for Napoleon but to support his ally. In the campaign of 1859 (see ITALY) the War Minister, La Marmora (q.v.), took command of the Sardinian forces, and Cavour assumed the onerous duties of Minister of War. When Napoleon, who had declared that Italy should be free "from the Alps to the Adriatic," made with Austria the Peace of Villafranca, without consulting his ally, and thus abandoned the Italian cause at a time when the expulsion of Austria from the peninsula seemed certain, Cavour was frantic with rage and grief. He resigned his office and went into retirement at Leri, feeling that this betrayal of Italy had disgraced him; but in reality he had become the idol of an Italy which now learned to know the depth of his patriotism and the far-sightedness of his policy. The new Ministry under Rattazzi proved unequal to the situation; in England, the return of the Whigs to power under Lord Palmerston enlisted that country more actively in the Italian interest; and in January, 1860, Cavour returned to his post at the head of the Government. The cession of Savoy and Nice to France, in return for the union of northern Italy, had been agreed upon at Plombières, and Cavour now took his stand upon the execution of the pledge. It was one of the hardest tasks of his life, and the act for which he has been most criticised.

The next move in the campaign for the union of Italy came from southern Italy, in the form of an insurrection in Sicily against the Bourbon Government. This, and Garibaldi's violation of international comity in conducting an expedition in aid of the Sicilian revolutionists, were not planned or promoted by Cavour; but when they had become facts he characteristically winked at their irregularity and prepared to check excesses and to make the most of any opportunity they might offer. When Garibaldi crossed the Straits of Messina and entered the Neapolitan mainland, Cavour sent a Sardinian army into Umbria and the Marches, and another great step toward Italian unity was taken in the contest for southern Italy and the Papal domains. Garibaldi's arbitrary methods made him Cavour's antagonist at this time, though the two men always respected and appreciated each other. (See GARIBALDI.) On October 11, 1860, true to his lifelong principles, Cavour secured the passage of a bill by the Piedmontese Parliament authorizing the Government to incorporate such provinces in central and southern Italy as should express their desire therefor by a plébiscite. At the beginning of 1861 all Italy, except Venetia and Rome, was united, and on February 18 the first Italian Parliament met in Turin. Cavour now sought to complete the historic Italy by having Rome made the capital, and in May a vote of Parliament to that effect was passed; but Cavour did not live to see this consummation brought about, nor to see the annexation of Venetia. He died in Turin, June 6, 1861, worn out by the excessive labors and cares of his public life.

Count Cavour never married. The one brief romance of his youth brought color and inspiration into his life through a woman's devoted and unselfish love, but not even her name is known, and the attachment was far greater on her part than on his. He was beloved by the peasants on his estates, and trusted by the common people generally. His King, whom he served so faithfully, never felt quite comfortable when his masterful subject was in power, but he had implicit confidence in him and believed in his success; and it was so with all his associates—his power lay in the assurance of success. He was admired by European statesmen. Napoleon said at Plombières: "There are only three men in Europe—we two and then a third whom I will not name." And the veteran Metternich is reported to have remarked: "There is only one diplomatist in Europe: but unfortunately he is against us—it is M. de Cavour." With all his determination, and his frequent disregard of the nature of the means used to attain his ends, Cavour held firmly to the principles of civil liberty and constitutional government. He was equally distrustful of the doctrinaire republicanism of Mazzini, whom he never liked, and of autocracy in any guise. It is a fine testimonial to his patriotism that he enjoyed the confidence of the exiled Venetian patriot and devoted republican, Manin, in spite of his distrust of Manin's political doctrines. From their first meeting in Paris Manin saw in Cavour the regenerator of Italy. Cavour's writings and speeches on political subjects have been published as *Opere politico-economiche del conte Camillo di Cavour* (Coneo, 1855), and *Discorsi parlementari del conte Camillo di Cavour*, published by order of the Chamber of Deputies (Turin, 1863-80).

Consult: Mazade, *Le comte de Cavour* (Paris, 1877); Massari, *Il conte di Cavour* (Turin, 1873); Countess Cesaresco, *Cavour* (New York, 1898); Tivaroni, *Storia critica del risorgimento d'Italia* (Turin, 1888-97); Artom and Blanc, *Il conte di Cavour in parlamento* (Florence, 1868); also the memoirs and correspondence of Kossuth, D'Azeglio, Ricasoli, La Farina, and others. A very full bibliography will be found in the little essay by the Countess Cesaresco, and in Stillman, *The Union of Italy* (Cambridge, 1898).

CAVY, kā'vĭ (Neo-Lat., Port. *cavia*, from native Indian word). A small South American rodent of the family Caviidæ, allied to the capybara and the agoutis, exclusively neotropical, and represented familiarly by the guinea-pig. The cavies are restless, semi-nocturnal, herbage-eating creatures, dwelling in burrows or crevices, increasing rapidly, and furnishing food for both man and beast throughout the plains and unforested highlands of that continent. The largest species (*Cavia patchonica*), sometimes called 'agouti,' formerly spread throughout the plains of all Argentina, but now nearly extinct, resembles a hare standing upon terrier-like legs; it is a foot in height, and rusty-red in general color. It digs deep burrows of its own, and also occupies those of the vizcacha. The restless cavy (*Cavia forcellus*), or 'aperea,' and Cutler's cavy (*Cavia Cutleri*) are common in burrowing colonies in the La Plata Valley, and seem to be the ancestors of the guinea-pig, though uniformly colored, the former grayish-brown, the latter nearly black. Other species inhabit rocky places to a considerable altitude in Brazil and Bolivia. Consult Hudson, *Naturalist in La Plata* (London, 1892). See GUINEA-PIG; and Plate of CAVIES, ETC.

CAWDOR, ka̤'dẽr. A parish in County Nairn, Scotland (population in 1901, 925), ten miles east by north of Inverness, noted as the site of Cawdor Castle, in which Shakespeare places the murder of Duncan by Macbeth. During the Rebellion of 1745 Lord Lovat was, according to tradition, for a time concealed in this castle. It is in an excellent state of preservation, and presents a fine specimen of a true baronial stronghold of feudal times.

CAWDOR, THANE OF. A character in Shakespeare's *Macbeth*, who does not appear on the stage, but whose title is coveted by Macbeth and secured by his causing him to be executed for treason. The description of the character, especially as to his bearing at the hour of death, has led Shakespearean editors to find here a reference on the part of the author to the unfortunate Earl of Essex.

CAWEIN, MADISON JULIUS (1865—). An American poet, born and educated in Louisville, Ky. He is the author of *Blooms of the Berry* (1887); *The Triumph of Music* (1888); *Accolon of Gaul* (1889); *Lyrics and Idyls* (1890); *Days and Dreams* (1891); *Moods and Memories* (1892); *Poems of Nature and Lore* (1893); *Red Leaves and Roses* (1893); *Intimations of the Beautiful* (1894); *Undertones* (1896); *The Garden of Dreams* (1896); *Shapes and Shadows* (1898); *Idyllic Monologues* (1898); *Myth and Romance* (1898); *One Day and Another* (1901). His verses are commendable for stylistic color.

CAWNPORE, ka̤n-pōr', or **CAWNPUR**, ka̤n-po͞or' (Hind. *Kanhpur*, city of Krishna, from *kanh*, Skt. *krsna*, *krishna*, black + *pur*, Skt. *pura*, city). A city, capital of a district of the same name in the Allahabad division of the North-West Provinces, British India, on the right bank of the Ganges, at the junction of the Jumna, 140 miles above Allahabad (Map: India, D 3). The stream in front, varying according to the season from 500 yards to more than a mile in width, presents a large and motley assemblage of steam vessels and native craft. Cawnpore's modern importance is due to its commercial facilities, and partly to military and political considerations. Since 1888 it has been brought into direct communication with Bombay, through the opening of the railway to Jhansi, and, at the junction of four lines, it is one of the chief railway stations in India. It has an extensive trade in grain and agricultural produce, and important manufactures of home commodities, such as cotton, leather, etc. The town contains mission churches, schools, zenanas, a club, and good hotels. It owns municipal water-works. It has belonged to the English since 1801. The name of Cawnpore is associated with the events of the Sepoy Mutiny, one of the most terrible episodes of which was enacted here in July, 1857, the massacre of the European women and children by Nana Sahib. A prominent feature of Cawnpore is the memorial garden, covering the scene of the massacre. Marochetti's angel in white marble, under the Gothic monument over the well in which the dead and dying were cast, is a superb piece of sculpture. Though Cawnpore is only 379 feet above the sea, yet during winter considerable quantities of ice are made for preservation, through the exposing of water by night in shallow vessels. Population, in 1891, 163,800; in 1901, 197,000. Area of district, 2366 square miles. Population, in 1891,

CAVIES, ETC.

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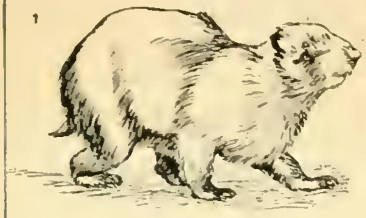

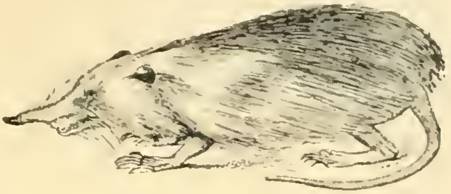
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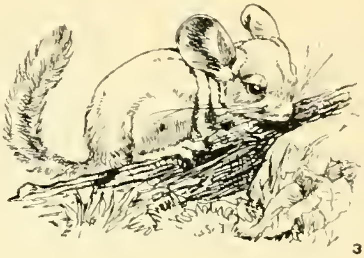
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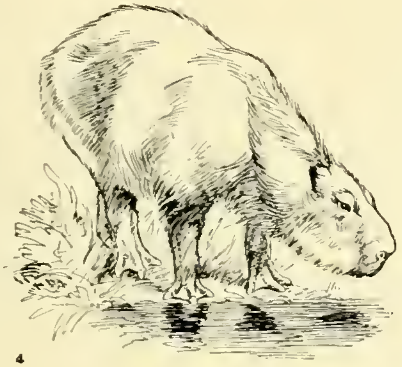
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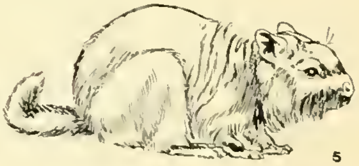
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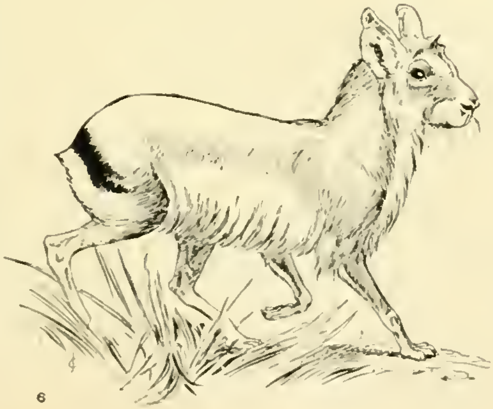
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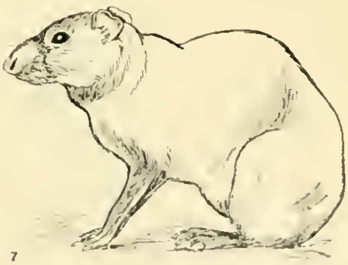


1. JAMAICAN SHORT-TAILED HUTIA (Capromys brachyurus).
2. ALMIQUI (Solenodon Cubanus).
3. CHINCHILLA (Chinchilla lanigera).
4. CARPINCHO or CAPYBARA (Hydrochœrus capivara).
5. VIZCACHA (Lagostomus trichodactylus).
6. PATAGONIAN CAVY (Dolichotis Patchonica).
7. AGOUTI (Dasyprocta aguti).

1,209,700; in 1901, 1,259,200. Consult Trevelyan, *Cawnpore* (London, 1865).

CAXAMARCA, kä′нȧ-mär′kȧ. See CAJAMARCA.

CAXIAS, kȧ-shē′ȧs. A town in Brazil, situated in the State of Maranhão (Map: Brazil, J 5), on the river Itapicurú, about 300 miles southeast of Maranhão. It has a large trade in rice and cotton, the river being navigable. It is the birthplace of the poet Luis Gonçalvez Dias. Population, about 10,000.

CAXIAS, LUIS ALVEZ DE LIMA E SILVA, Duke of (1800-80). A Brazilian general and statesman. He was born in Rio de Janeiro, and entered the army at the age of twelve. In 1850 he was appointed Minister of War and president of the Council, and afterwards, as commander-in-chief of the Brazilian Army, he conducted the war against Paraguay. From 1875 to 1878 he was again president of the Council and Minister of War.

CAXTON, WILLIAM (c.1422-91). The first English printer. He was born in the Weald of Kent, and the particulars of his life are scanty. He was apprenticed in 1438 to Robert Large, a wealthy London mercer. At the death of the latter, in 1441, he went to Bruges, where, from 1462 to 1470, he was governor of a chartered association of English adventurers trading to foreign parts. In 1471 Caxton entered the service of Margaret, Duchess of Burgundy, formerly an English princess; and, apparently toward the end of 1476, he set up his wooden printing-press at the Sign of the Red Pale, in the Almonry, at Westminster. The art of printing he had acquired while abroad, either at Cologne or at Bruges, more likely at the latter place, from Colard Mansion, a well-known printer of that city; and in 1474 he put through the press (without much doubt Mansion's) the first book printed in the English tongue, the *Recuyell of the Historyes of Troye*, a translation of Raoul de Fevre's work. The *Game and Playe of the Chesse* (probably 1475) was another of Caxton's earliest publications; but the *Dictes and Notable Wise Sayings of the Philosophers*, (published November 18, 1477) is the first book which can with certainty be maintained to have been printed in England. All the six fonts of type from which Caxton printed may be called black letter. Of the 99 known distinct productions of Caxton's press, no fewer than 38 survive in single copies or in fragments only. Caxton, who was an accomplished linguist, and translated many of the works that issued from his press, was diligent in the exercise of his craft or in translation until within a few hours of his death, which occurred in 1491. By his numerous translations he helped fix the English speech, and his many books prepared the way for the literary outburst in the Elizabethan era. In 1877 the great printer and his work were fittingly commemorated by a typographical exhibition in London. Consult: Knight, *The Old Printer and Modern Press* (London, 1861); Blades, *Life and Typography of William Caxton* (London, 1861-63); and *Biography and Typography of Caxton* (London, 1882).

CAXTONS, THE. A novel by Bulwer Lytton, published in 1850 (three volumes octavo). A new edition of it appeared each year from 1852 to 1855, and its sale in the United States for the first three years exceeded 10,000 annually. It was originally published in *Blackwood's Magazine*. The scene is chiefly laid in the midst of English country life, and the interest consists largely in the conversations which are held between the members of the Caxton family. Pisistratus Caxton, the *ego* of the story, also appears in *My Novel* and other later works of the author.

CAXTON SOCIETY. An association formed in London, in 1845, for the purpose of publishing mediæval chronicles and other works. Of these, it issued 16 volumes before its dissolution in 1854.

CAYAMBÉ, kä′yȧm-bā′, or **CAYAMBÉ-URCU**, -o͞or′ko͞o. A volcanic peak of the Andes, situated in Ecuador, about 60 miles east-northeast of Quito, and almost directly under the equator (Map: Ecuador, B 3). It has an altitude of about 19,200 feet, and is covered with perpetual snow.

CAYCOS, kī′kȯs. See CAICOS.

CAYENNE, kȧ-ĕn′ *or* kī-ĕn′. The capital of French Guiana (Map: South America, G 2). It is situated on an island of the same name in the Atlantic, in latitude 4° 56′ N. and longitude 52° 20′ W. It has a well-protected though shallow harbor, several fine churches, two hospitals, a bank, and an ecclesiastical college. Cayenne is the only outlet for the products of French Guiana, and has direct steamer communication with France. The climate is moist, but not very unhealthful. There are about 13,000 inhabitants. Cayenne was founded in 1604, and became a French possession in 1675. It was formerly used as a penal settlement.

CAYENNE PEPPER. See CAPSICUM.

CAYES, kȧ. See AUX CAYES.

CAYLEY, kā′lĭ, ARTHUR (1821-95). An English mathematician. He was born at Richmond, Surrey, and was educated at King's College, London, and at Trinity College, Cambridge. In early life he devoted much time to the study and practice of law, being admitted to the bar in 1849, and some of his most brilliant mathematical discoveries were made during this period. Finally, in 1863, he left the legal profession to accept the Sadlerian professorship of mathematics at Cambridge. Cayley's most important contribution to mathematics is the theory of invariants. (See FORMS.) He also discovered an interesting higher curve, known as the Cayleyan, and the principal proposition of matrices, known as Cayley's Theorem. Many of his numerous memoirs were published in the Cambridge *Mathematical Journal*. His collected mathematical papers have been published in book form (13 vols. and supplement, Cambridge, 1889-98).

CAYLEYAN, kā′lē-*an*. In mathematics, the envelope of the system of straight lines which constitute polar conics relative to any curve of the third order. The Cayleyan is a curve of the sixth order and the third class. (See CURVES.) It was named by Cremona in honor of its discoverer, Cayley (q.v.), who had originally called it the *pippian*.

CAYLUS, kȧ′lụs′, ANNE CLAUDE PHILIPPE DE TUBIÈRES, Count de (1692-1765). A French archæologist. He entered the army, served in the Spanish War of Succession, and after 1714 traveled in Italy, Greece, England, Germany, and the

East, making collections of antiquities on which he published several learned works in French and Latin. He was a patron of art, and especially of engraving, which he himself practiced. In this field he wrote *Nouveaux sujets de peinture et de sculpture* (1755), and *Tableaux tirés de l'Iliade, de l'Odyssée et de l'Enéide* (1757). He also wrote fiction, which has the kindly humor and attractive simplicity that characterized his own personality. Consult Rocheblave, *Essai sur le comte de Caylus* (Paris, 1890).

CAYLUS, Marie Marguerite Le Valois de Villette de Murçay, Marquise de (1673-1729). A French Court lady and author at the time of Louis XIV., mother of the preceding. She was a descendant of the family of D'Aubigné, but was converted by her aunt, Madame Maintenon, to the Roman Catholic faith. She acquired celebrity as one of the leaders of Court society. Racine so admired her abilities that he wrote the prologue to his tragedy of *Esther* as a compliment to her. Voltaire edited her *Souvenirs* (1770), which abound in interesting anecdotes about the Court of Louis XIV.

CAYMAN, kā′man, or **CAIMAN** (Sp. *caiman*, from the Caribbean name). A native name applied loosely to various alligators, especially the South American, also called jacares. Some systematists put *Alligator palpebrosus* and *Alligator trigonatus* into the genus Cayman, on account of the three thick bony plates which make their eye-orbits stand out prominently, so that the former is called the eyebrowed cayman. Their habits are substantially the same as those of the common alligator (q.v.).

CAYMANS. A group of three low islets in the West Indies from 130 to 190 miles northwest of Jamaica, of which they are an administrative dependency (Map: Cuba, D 7). It consists of Grand Cayman (17 miles long and 4 to 7 miles broad), Little Cayman, and Cayman Brac, with a total area of 225 square miles. The pasturage is good and the chief exports are cocoanuts and turtles. Population, 4300.

CAYUBABA, kä′yōō-bä′bȧ. A tribe without any known linguistic affinities, now gathered into the mission of Exaltacion, on Mamoré River, Bolivia. They are of good physique and are fine boatmen. In spite of Christianity, they have retained some of their strange primitive customs. A man does no work during his wife's menstrual period, neither will a widower undertake any important enterprise until he remarries.

CAYUGA, kȧ-yōō′gȧ (N. Amer. Indian *Gwé-u-gweh-o-nó*, people of the mucky land). The smallest of the five tribes of the original Iroquois Confederacy. They formerly dwelt on Cayuga Lake, New York, but on the outbreak of the Revolution most of them, together with the Mohawks, joined the British side and removed to Canada, whence they never returned. They may number perhaps 1000 souls, of whom about 170 are living with the Senecas in New York, a few are with the Senecas in Indian Territory and the Oneidas in Wisconsin, while the main body is on the Six Nations Reserve on Grand River, Ontario. The name seems to refer to a cranberry swamp.

CAYUGA LAKE. A beautiful sheet of water in west central New York (Map: New York, D 3). It is 38 miles long, from 1 to 3½ miles wide, and enters Tompkins County, but lies between portions of Tompkins and Cayuga counties on the east and Seneca County on the west. It is 377 feet above tidewater, and 130 feet higher than Lake Ontario, into which it empties through the Seneca and Oswego rivers. At the north end the lake is shallow, but in other places reaches a depth of 400 feet. It is navigable for 30 miles. Along its cliff-like banks are several thriving towns. Ithaca, near the south end of the lake, Aurora, near the middle of the eastern shore, and Cayuga, near the north end, are the chief cities. The lake is much frequented by tourists and pleasure-seekers.

CAYUSE. A warlike tribe formerly occupying the Blue Mountain region, adjoining the Columbia River, in northwestern Oregon, and now gathered upon the Umatilla Reservation in the same country. In 1847 the smallpox, before unknown among them, carried off a large portion of the tribe, and believing that it had been introduced by the missionaries, they attacked and destroyed Waiilatpu Mission, which had been established among them a few years before. They are now officially reported to number 365, most of them intermarried with other tribes, and only some half-dozen individuals speak their own old language, which thus far remains unclassified, but may prove to be of Shahaptian stock. They acquired the horse at an early day, probably through Mexico and California, and were instrumental in its distribution among other tribes, whence the application of their name to the Indian pony.

CAY′VAN, Georgia (1858—). An American actress, born at Bath, Maine. She was educated in Boston, and was for a time a professional reader. As an actress she first appeared as Hebe in *Pinafore* at the Boston Theatre, 1879. In 1880 she began playing the part of Dolly Dutton in *Hazel Kirke* at the Madison Square Theatre, New York. The next year, at the Globe Theatre, Boston, she made a considerable sensation as Iocasta in *Œdipus Tyrannus* with George Riddle. In 1882 she was Lisa in the melodrama *The White Slave*, at the Fourteenth Street Theatre, New York, and Luxa in *The Romany Rye*, at Booth's Theatre.. From 1887 to 1894 she was leading lady of the Lyceum Theatre stock company, winning successes in *The Wife*, *The Charity Ball*, *Squire Kate*, and numerous other plays. An illness obliged her to leave the stage in 1894, and though in the season of 1896-97 she returned and starred for a time, the failure of her health compelled her final retirement. Consult: Clapp and Edgett, *Players of the Present* (Dunlap Society, New York, 1899); and Edmunds, in *Famous American Actors of To-Day*, edited by McKay and Wingate (New York, 1896).

CAZALÈS, kȧ′zȧ′lĕs′, Edmond de (1804-76). A French political writer, son of Jacques Antoine Cazalès. He studied law and received a legal appointment, but soon gave his chief attention to political affairs, and was largely occupied with the question of the reconciliation of the Roman Catholic Church with the principles of the Revolution. In 1843 he took holy orders, and two years later became director of the ecclesiastical seminary of Montauban. He was active during the Revolution of 1848 and in the events of 1871-72. During the first Republic, he served in the Constituent Assembly. He frequently contributed to the *Revue des Deux Mondes* and other periodicals, and published *Études historique et critique sur l'Allemagne contemporaine* (1853), and *Nos maux et leur remèdes* (1874).

CAZALÈS, Jacques Antoine Marie de (1752-1805). A French politician. He was captain of dragoons at the assembling of the States General, in which he was an eloquent defender of royal and clerical authority. In the Constituent Assembly he argued for a government intermediate between an absolute and constitutional monarchy, and with Mirabeau tried to organize a conservative liberal party. He was among the first to formulate the principles of the legitimists. After the arrest of Louis XVI. he offered to serve in the army of Condé, but he had become so unpopular that his services were refused. He fled to Italy, and thence went to Spain and England. He returned to Paris in 1803.

CAZALLA DE LA SIERRA, kȧ-thä'lyȧ dȧ lȧ syār'rȧ. A mining town of Spain, in the Province of Seville, 53 miles by rail from Seville (Map: Spain, C 4). It is in a rich mineral region which yields silver, copper, iron, and sulphur, and has also iron-foundries and distilleries. Population, in 1900, 7782.

CAZEMBE, kȧ-zĕm'be, or **KAZEMBE**. A country in Central Africa, north of Lake Bangweolo, forming a part of the British Central African possessions since 1891 (Map: Central Africa, E 4).

CAZIN, kȧ'zăN', Jean Charles (1840-1901). A French landscape painter. He was born at Samer, Pas-de-Calais, and studied under Lecoq de Boisbaudran. He received a medal of the first class in 1882, and became a member of the Legion of Honor in 1889. He painted both figures and landscapes, which he invested with a tender charm peculiarly his own. In rendering moonlight effects he has few, if any, superiors in modern landscape painting. He painted twilight and dusk with chastened melancholy. The figures introduced in his pictures are subordinate to the landscape that environs them, forming with it a harmonious whole. Through such works as "Judith," "Tobit" (1878, Lille), and "Hagar and Ishmael" (1880, Luxembourg), Cazin has become the exponent of the landscape of religious sentiment. More secular are "La terre," "Souvenir de fête," and the decorations of the Hôtel de Ville, Paris. He was an ardent champion of wax painting, which, especially in his early works, like the "Flight into Egypt," he sought to revive.

CAZORLA, kȧ-thôr'lȧ. A town of Andalusia, Spain, 40 miles east-northeast of Jaen. It is a place of considerable antiquity, pleasantly situated on a declivity, and watered by the Vega. It has two old castles—one an Arab structure. Manufactures of leather, earthenware, soap, and bricks, and a trade in agricultural produce are carried on. Population, in 1900, 7936.

CAZOT, kȧ'zô'. Théodore Joseph Jules (1821—). A French politician and jurist, born at Alais (Gard). He was elected to the National Assembly in 1871, and in 1875 became a permanent member of the Senate. In 1879-82 he served as Minister of Justice, and in that capacity he was prominent in the execution of the decrees against the Jesuits and unauthorized congregations. He became president of the Court of Cassation in 1883, but resigned in the following year.

CAZOTTE, kȧ'zŏt', Jacques (1719-92). A French writer of humorous tales. His works include a romance, *Ollivier* (1762), partly in prose and partly in verse; such tales as *Le lord impromptu* (1771) and *Le diable amoureux* (1771), and several other stories. He also wrote songs, which attained great popularity, and some philosophical works. He opposed the Revolution and was guillotined as a royalist by the Revolutionary Tribunal.

CEADDA, kĕăd'dȧ, or **CHAD**, Saint (? 672). An English prelate, Bishop of York, and afterwards of Lichfield. Bede, in the *Historia Ecclesiastica Gentis Anglorum*, gives many beautiful examples of this holy man's simplicity and 'zealous love of pious toil.'

CEAN-BERMUDEZ, thȧ-än' bĕr-mōō'dȧth, Juan Agustin (1749-1829). A Spanish art critic and archæologist, born at Gijon, Asturias. He was the author of some valuable works on art, among which are: *Diccionario histórico de los mas ilustres profesores de las bellas artes en España* (1800); *Noticias de los arquitectos y arquitectura de España* (1829); and *Sumario de las antiguedades romanas que hay en España* (1832).

CE'ANO'THUS (Neo-Lat., from Gk. κεάνωθος, *keanōthos*, thistle). A genus of American shrubs or small trees, belonging to the order Rhamnaceæ. There are about forty species, most of which are found in the Pacific Coast States. Many are in cultivation as ornaments, but the most desirable species are only semi-hardy in the eastern and northern United States. New Jersey tea, or red-root (*Ceanothus Americanus*), is a hardy shrub attaining a height of about three feet, with ovate, irregularly serrate, bright-green leaves and abundant white flowers in large panicles. The flowers are short-lived, but from their abundance are very ornamental. This species is found in dry woods from Canada to Texas. The leaves are said to have been used as a substitute for tea during the war of the American Revolution, and are still so used by poor farmers of the Southern States. Some of the Pacific species have pink or blue flowers which are very attractive.

CEARÁ, sā'ȧ-rä'. A State of Brazil, on the north coast, bounded by the States of Rio Grande do Norte and Parahyba on the east, Pernambuco on the south, and Piauhy on the west (Map: Brazil, K 4). It has an area of 40,240 square miles. The coast regions are sandy and unproductive: the centre is occupied by an elevated plateau, sparsely watered and fit only for pasture. The most fertile portion is found in the mountainous regions, where the slopes are especially well adapted for the cultivation of coffee. The climate is very hot, and the rainfall mostly insufficient. The chief products are corn, rice, sugar, coffee, watermelons, and pineapples. The forests yield numerous resinous plants for export. Population, in 1890, 805,687, consisting chiefly of Indians and of persons of mixed Indian and negro descent. Capital, Fortaleza (q.v.). Consult Fontenelle, *The State of Ceará* (Chicago, 1893).

CEB'ADIL'LA. See Sabadilla.

CEBALLOS, sȧ-bä'lyôs, José (1830—). A Mexican soldier. He was born in the city of Durango, and was appointed brigadier-general in

1870, in which capacity he commanded the First Division of the Federal troops of Mexico in the campaign against the bandit Losada, who had placed himself at the head of a force of 10,000 Indians. Upon the installation of Lerdo de Tejda as President of Mexico, Ceballos had Camarena, the Governor of Jalisco, deposed after a long and sanguinary engagement between the Federal and State troops. Ceballos remained as Governor of Jalisco until 1876, when Lerdo's Government was superseded by that of Diaz. He later went to California and then to Guatemala, where he was appointed director of the Military School. After plotting a revolution against Diaz, he suddenly espoused the cause of the latter, went to Mexico, and was appointed Governor of the Federal District, the highest office after the Presidency. He frequently antagonized the press, and in 1885 a number of journalists and students were imprisoned by him.

CEBALLOS, Juan Bautista (1811-c.1854). A Mexican jurist, born at Durango. He was made president of the Supreme Court in 1852. Upon the resignation of Arista, in 1853, he became President of Mexico *ad interim*, with extraordinary powers for three months. A month later he resigned.

CE'BES (Gk. Κέβες). A Greek philosopher, born at Thebes in Bœotia. He was a disciple of Socrates, at whose death he was present, and also a pupil of Philolaus. He is represented by Plato as a serious-minded thinker who was eager for philosophical knowledge. He is reported to have written three dialogues in the Socratic style, the *Phrynichus*, the *Hebdome*, and the *Pinax*, or *Tabula*, the last of which is the only one extant. It is almost certain, however, that all three of these dialogues are spurious, and the *Pinax* was probably written in the First Century B.C. or the First Century A.D. by a disciple of the Stoic or Cynic school of philosophy. The *Pinax* professes to be the explanation of an allegorical picture representing human life and the condition of the human soul before its union with the body. It inculcates the Socratic doctrine that only education of the mind and consciousness of virtue can lead to happiness. Edited by Prächter (Marburg, 1885).

CEB'IDÆ (Neo-Lat. nom. pl., from *Cebus*, from Gk. *κῆβος*, *kēbos*, long-tailed monkey). A family of Primates embracing all the American monkeys (formerly designated as platyrhine) except the marmosets. The features in which they differ from the monkeys of the Old World are stated under Monkey. The family includes several genera described under Douroucoli; Howler; Saki-Monkey; Sapajou; Spider-Monkey; Squirrel-Monkey; Titi-Monkey; and Uakari.

CEBÚ, sā-bōō', *Sp. pron.* thâ-bōō', or **ZEBU.** One of the Philippine Islands, situated between the islands of Bohol and Leyte on the east and Negros on the west, and lying between latitudes 9° 25' and 11° 20' N., and longitudes 123° 10' and 124° 5' E. (Map: Philippine Islands, H 9). It is of an oblong form, and has a length of about 130 miles, but does not exceed 20 miles in breadth. Area, 1742 square miles. Its surface is very mountainous, but only moderate altitudes are reached. The soil is fertile and produces tobacco, cotton, rice, and hemp. The reported minerals are coal, oil, gold, lead, silver, and iron. The population of Cebú, together with that of the neighboring islands of Camotes, Mactan, and Bantayan, which are included in the Province of Cebú, is over 500,000, consisting of Vizayas, Mundos, and some Negritos. Capital, Cebú.

CEBÚ. The capital of the island Province of Cebú, Philippines, and formerly the seat of government of the entire Visayan group (Map: Philippines, F 7). It is situated on the eastern coast of the island and is fortified by a triangular fort. The town is well built, and contains an episcopal palace, a cathedral, a post-office, and a telegraph station. It is the chief mercantile centre of the Visayan Islands. Cebú is regarded as the oldest city in the Philippines, and was the capital of the archipelago from 1565 to 1571. Population, in 1898, 35,243.

CECCHI, chĕk'kē, Antonio (1849-96). An Italian explorer. He was born in Pesaro, and was educated in Pesaro, Triest, and Venice. In 1877 he joined the Italian geographical expedition to Abyssinia, and in 1885 he accompanied the first Italian military expedition to Massowah, and later concluded a naval and commercial treaty with the Sultan of Zanzibar. He was murdered by the Somalis. He wrote *Da Zeila alle frontiere del Caffa* (1887) and *L'Abissinia settentrionale* (1887).

CECCO D'ASCOLI, chĕk'kō däs'kō-lē (c.1257-1327). The popular name of Francesco degli Stabili, a learned Italian astrologer and poet. He studied mathematics and astrology, and was professor in the University of Bologna. Having published a commentary on Sacrobosco's *Sphæra Mundi*, in which he propounded bold theories concerning the employment and agency of demons, the Clerical Party caused him to be condemned to certain fasts, prayers, and fines; but he eluded punishment by going to Florence. His free-thinking and plain-speaking, however, procured him many enemies; he had attacked Dante's *Commedia* and his fate was sealed; an old accusation of impiety was renewed, and he was tried, sentenced, and burned at the stake in Florence, in the seventieth year of his age. Consult W. S. C. Baddely, *Charles III. . . . also Cecco d'Ascoli, Poet, Astrologer, Physician* (London, 1894).

ČECH, chĕk, Svatopluk (1846—). A Czech poet. He was born at Ostredek, and was educated at Prague. As a poet, Čech is the foremost representative of the distinctively national Czech poetry. He excels more particularly in the epic genre, while his numerous tales, sketches, personal reminiscences, satires, and novels constitute the finest prose productions in the national literature of Bohemia. In 1895 he was elected to the Austrian Reichsrat. The following are a few of his principal poetic works: *Poems* (1874), containing, among others, the epics entitled "The Angels" and "The Dreams." *New Collection*, 4th ed. (1896); *The Circassian.*

CECID'IUM. See Gall and Malformation.

CECIDOMYIIDÆ, sĕs'ĭ-dō-mī'yĭ-dē (Neo-Lat. nom. pl., from Gk. *κηκίς*, *kēkis*, gall-nut, from *κηκίειν*, *kēkiein*, to gush forth + *μυῖα*, *myia*, fly). A family of minute flies, with hairy bodies, sparsely veined wings, and many-jointed antennæ, furnished with whorls of hair. Most of the larvæ make galls. See Gall-Insects.

CECIL, sĕs′il *or* sĭs′il. RICHARD (1784-1810). An English evangelical divine of the Established Church, born in London. He originally professed skeptical views, but in 1772 was converted, and from 1773 studied at Queen's College, Oxford. In 1777 he was ordained priest, and in 1780 he became rector of Saint John's, Bedford Row, London. He was distinguished for his eloquence, and was considered the most prominent evangelist of his time. His collected works (4 vols., 1811) have been often reprinted (for example, in New York in 1845, 3 vols.), and contain, particularly in Vol. IV., valuable contributions to the discussion of various religious questions. Consult Pratt, *A Memoir of the Character of the Rev. R. Cecil*, Vol. I. of the *Works* (London, 1811).

CECIL, ROBERT, Earl of Salisbury (1563-1612). An English statesman, son of William Cecil, Lord Burghley. On the death of his father, having previously held important offices, he succeeded to a position corresponding in a measure to what is now called the Premiership. On the accession of James I., Cecil was confirmed in his office, and in 1605 created Earl of Salisbury. In 1608 he was made Lord High Treasurer. Although of mean and deformed appearance, he was a man of immense energy and sagacity and the best English Minister of his time; but he was cold, selfish, and unscrupulous, and his connection with the disgrace of Essex and Raleigh laid him open to great odium. He died May 24, 1612. Consult Goldsmid (editor), *The Secret Correspondence of Sir R. Cecil with James VI. of Scotland* (Edinburgh, 1766; reprint, 1887).

CECIL, WILLIAM, Lord Burleigh or Burghley (1520-1598). One of England's foremost statesmen, the son of Richard Cecil, master of the robes to Henry VIII., He was born at Bourn, September 13, 1520. He was educated at Grantham and Stamford grammar schools, and at Saint John's College, Cambridge, where he distinguished himself, especially in Greek. Before he could take his degree he was removed by his father, and entered as a law student at Gray's Inn, to prevent his marriage with Mary, the sister of Cheke, the Greek professor. William, however, married her two months after his advent in London; but his happiness was short-lived, for she died on February 22, 1544. The following year (December 21, 1545) he married Mildred, daughter of Sir Anthony Cooke, a union which increased his political influence. In 1547 he became *Custos brevium* in the Court of Common Pleas, the reversion of which Henry VIII. had previously given him, and in 1548 was appointed Secretary of State through the friendship of the Lord Protector, Somerset. He shared in Somerset's downfall and imprisonment; but two years later, by his wisdom and prudence, was reappointed Secretary of State by the Duke of Northumberland, Somerset's enemy. When Queen Mary ascended the throne Cecil, as a Protestant, resigned office, but maintained good relations with the Roman Catholic party, and was one of the few eminent Protestants who escaped in purse and person during her reign. Owing to his freedom from persecution, he has been unjustly accused of being a 'trimmer.' Cecil was cautious and politic, and averse to extremes in religion. The rejection of the bill which the Roman Catholics introduced into Parliament, to confiscate the estates of Protestants, was mainly due to him. Cecil was merciful and tolerant, as compared with the narrow Whitgift or the bigoted Aylmer; but he was not guiltless of the cruel religious persecutions which disgraced Elizabeth's reign. The use of the torture and the employment of spies are a dishonor to his memory. Prior to Mary's death, Cecil corresponded with Elizabeth, who recognized his capacity for government, and appointed him Secretary of State on her accession to the throne (November 16, 1558). For forty years he was the originator and director of that policy which made Elizabeth's reign memorable, and although Elizabeth occasionally favored other courtiers, Cecil was the statesman whose judgment she relied on in all matters of importance. His policy at home and abroad was shrewd, cautious, liberal, and comprehensive, and the quality of prompt decision was also his. As a statesman he was above animosities and favoritism: his enemies never suffered and his friends profited nothing by his power. He was a man of classical attainments and a voluminous writer. In 1564 Cambridge created him M.A., and Oxford conferred the same honor in 1566. The Queen created him Baron Burleigh, Knight of the Garter, and Lord High Treasurer. He died August 15, 1598. Consult: Nares, *Memoirs of Lord Burghley* (3 vols., London, 1828-31); Hallam, *Constitutional History*, Vol. I., Chaps. III., IV. (London, 1876); Hume, *Great Lord Burleigh* (London, 1898); Charlton, *Life* (Stamford, 1847); Strype, *Annals* (Oxford, 1824); Murdin (editor), *Collection of State Papers Left by Cecil* (London, 1759); Haynes (editor), *Collection of State Papers Left by Cecil* (London, 1740).

CECIL, or **GASCOYNE-CECIL**, găs-koin′, ROBERT ARTHUR TALBOT GASCOYNE. See SALISBURY, Marquis of.

CECIL′IA. The second of Frances Burney D'Arblay's novels, dealing with domestic life. See D'ARBLAY, MADAME.

CECILIA, SAINT. The patroness of music, who is said to have suffered martyrdom in A.D. 230. Her heathen parents, as we are told, belonged to a noble Roman family, and betrothed their daughter, who had been converted to Christianity, to a heathen youth named Valerian. This youth and his brother, Tiberius, became Christian converts, and suffered martyrdom. Cecilia, when commanded to sacrifice to idols, firmly refused, and was condemned to death. Her persecutors, it is said, first threw her into a boiling bath, but on the following day they found her unhurt. The executioner next attempted to cut off her head, but when he did not succeed in three strokes he was obliged by the law to abandon the attempt. She lived three days longer. As early as the Fifth Century there is mention of a church dedicated to her at Rome; and in 821, by order of Pope Paschal, her bones were deposited there. Saint Cecilia is regarded as the inventor of the organ and the patroness of church music. Her festival is celebrated on November 22d. Chaucer, Dryden, and Pope have celebrated Saint Cecilia, and the painters Raphael, Domenichino, Carlo Dolci, and others have represented her in fine pictures. Consult Guéranger, *Sainte Cécile et la societe* *romaine* (Paris, 1873).—Another Saint Cecilia was born in Africa, and suffered martyrdom by starvation under Diocletian. The Roman Catholic Church celebrates her festival on February 11.

CECILIA, Saint. A painting by Raphael, which hangs in the Accademia in Bologna, Italy. It was ordered by the Cardinal Lorenzo Pucci, in 1513, to decorate the Church of San Giovanni at Monte, but not completed until about two years later. It was taken to Paris during Napoleon's time, but was returned in 1815. The leading figure is represented as surrounded by Saint Paul, Saint John, Mary Magdalene, and Saint Augustine, and all five seem to be rapt with the strains which descend to them from the opening heavens.

CECILIA, Saint. A painting by Rubens, which hangs in the Old Museum of Berlin. It represents the saint attended by angels with musical instruments, and is noteworthy for the vividness of its coloring.

CECILIA, The Story of Saint. A series of frescoes (1588-89), five in number, by Domenichino (q.v.), representing the charity, fervor, martyrdom, and final rewards of Saint Cecilia. They are in the Church of San Luigi dei Francesi, Rome.

CECRO'PIA (Neo-Lat., from Gk. Κέκροψ, *Kekrops*, according to Greek myth founder of Athens). A genus of trees of the order Artocarpaceæ. *Cecropia peltata*, a native of the West Indies and of South America, sometimes called trumpet-wood and snake-wood, is remarkable for its hollow stem and branches, exhibiting merely membranous partitions at the nodes. The small branches, these partitions being removed, are made into wind instruments. The wood is very light, readily ignites by friction against a harder piece of wood, and is much used by the Indians for procuring fire in this way. The fruit is agreeable, and resembles a raspberry. Both the trunk and branches yield a large quantity of saline matter, which is employed by the French planters in the purification of sugar. The bark is strong and fibrous, and is much used for cordage. It is also astringent, and is applied in diarrhea and other diseases. This species is an example of myrmecophily in which ants dwell in the hollow stems. In return for the service of the tree in affording them shelter and food, they protect the tree from attacks of leaf-cutting ants, which abound in the tropics.

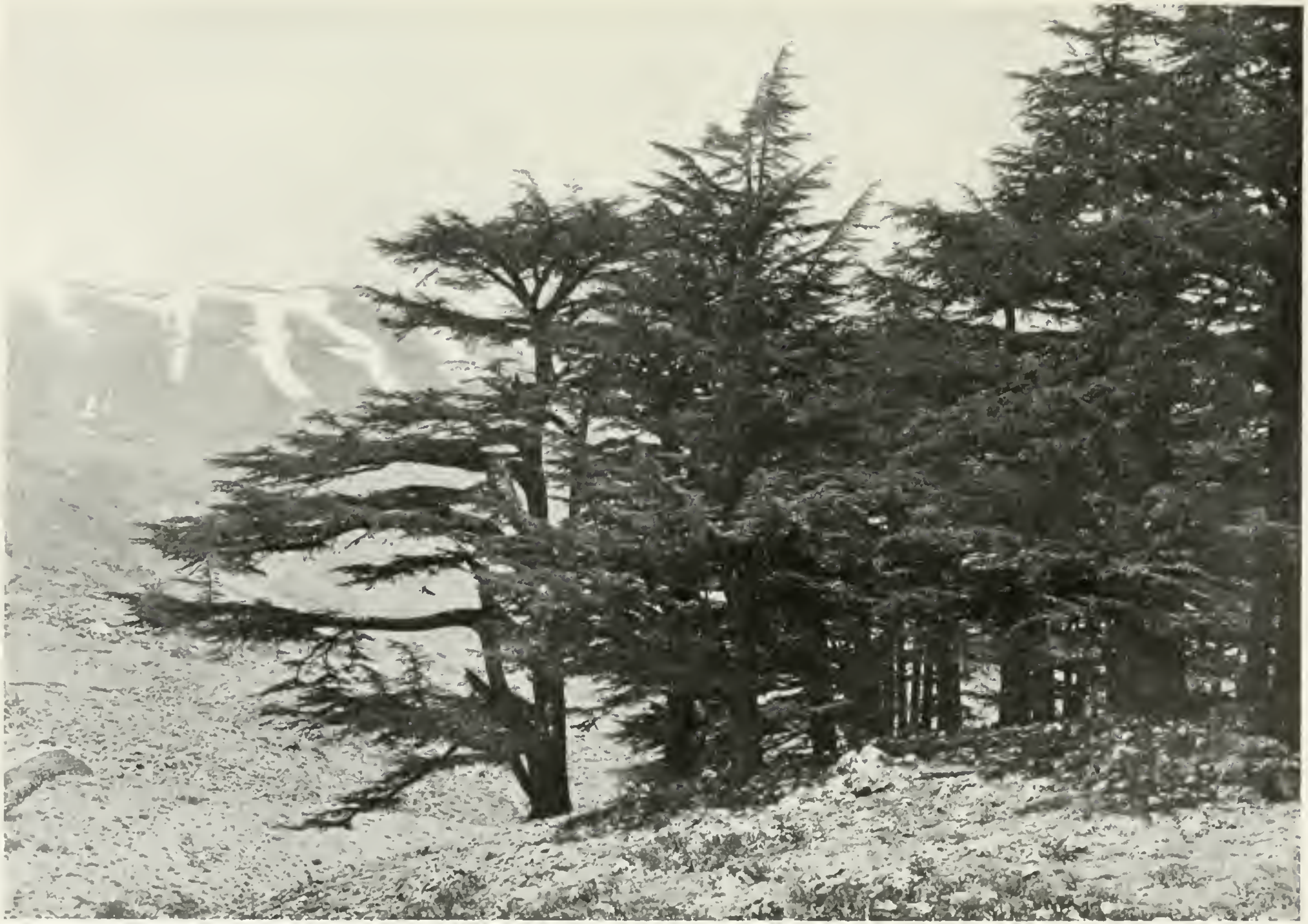
CECROPIA. The sister-in-law of King Basilius in Sidney's romance *Arcadia*.

CECROPIA MOTH (Neo-Lat. from Gk. Κέκροψ, *Kekrops*, according to Greek myth founder of Athens). The largest of the silkworm-moths (*Samia cecropia*), with wings expanding 5 to 6 inches, brown, marked by white, red, and buff. The caterpillar has coral-red tubercles on the second and third thoracic segments, and other tubercles, yellow and blue; it feeds on a great variety of forest and fruit trees. The cocoon is elongated, brown, papery, and unprotected by leaves. See Silkworm.

CE'CROPS (Lat., Gk. Κέκροψ, *Kekrops*). The first King of Attica, who figures in Greek mythology as an autochthon, half man and half serpent. At first probably the eponymous hero and ancestor of the people, he seems to have been crowded aside later by the figure of Erechtheus, though whether we have here the heroes of separate tribes may well be doubted. Later legend attributed to him, as the first King of Attica, the formation of a confederacy of twelve cities, the introduction of marriage, burial of the dead, writing, and other arts. The origin of the name is uncertain, and of course the entire personality is purely legendary.

CEDAR (OF. *cedre*, Lat. *cedrus*, from Gk. κέδρος, *kedros*, cedar-tree). A name applied to several species of coniferous evergreen trees, as well as to the wood of a number of trees in no way related to the conifers. The name properly belongs to the genus Cedrus, of which there are three species generally recognized—*Cedrus Libani*, the cedar of Lebanon; *Cedrus deodara*, the deodar-tree of India; and *Cedrus Atlantica*, of the mountains of northern Africa. By some botanists the last two are considered as merely varieties of the first-named species. All are characterized by their fragrant, light-red, durable wood. The cedars of Lebanon have been famous from early times, being frequently mentioned in sacred and profane writings. The original groves mentioned in the Bible have become greatly reduced through various causes, and the largest grove now known contains only about 400 trees, some of which are evidently of great age. The trees are noted for the size of their trunks rather than for their height. They differ from most conifers in that their branches are wide-spreading. The cones and leaves resemble those of the larch more than any other tree, except that the leaves are persistent. The cedar of Lebanon was introduced into England in the Seventeenth Century, and a number of noble specimens are now growing in that country. (For detailed illustration, see Plate of Calabash.) In the Jardin des Plantes of Paris may be seen a fine specimen planted by Jussieu in 1734. It is hardy in the United States only in the South and in California. In its natural home the cedar of Lebanon is found at elevations of 6000 feet or less, but it thrives best in sandy loam, where the roots can reach water. A white resin, called cedar-resin, is exuded by the trunks, and was formerly employed in embalming. A sort of oil or turpentine was also prepared from it, but neither the oil nor the resin is much known now. The deodar, or god-tree, and the *Cedrus Atlantica* resemble *Cedrus Libani* in appearance, and have similar uses. They are more abundant, and their timber is very valuable. The deodar forms extensive forests in the Himalayas at elevations of from 7000 to 10,000 feet. The trees often attain a height of 150 feet and a diameter of 8 feet. The wood takes a high polish, and is in demand for cabinet-work. *Cedrus Atlantica* is most abundant in the Atlas Mountains, and is used for the same purposes. Many other coniferous trees are given the name cedar. The Siberian cedar is *Pinus cembra;* Goa cedar, a species of cypress; red cedar, species of *Juniperus* (see Juniper), etc.

The white cedar of the United States is *Chamæcyparis thyoides*, a tree 30 to 90 feet high, found growing in swampy situations from Maine to Mississippi. The trees are evergreen, with small, scale-like leaves. The wood is exceedingly durable, especially when in contact with moisture. The tree resembles the arbor-vitæ, which is also sometimes called white cedar. The yel-



CEDARS OF LEBANON

low cedar of the Pacific Coast is *Chamæcyparis nootkatensis.* It is found from northern California to Alaska. The wood when seasoned is a beautiful light yellow, and takes a high polish, on which account it is highly esteemed for finishing lumber and cabinet-work. The Port Orford cedar (*Chamæcyparis Lawsoniana*) is quite similar, and is found in Oregon and California. There are many horticultural varieties of these cedars in cultivation, that vary in their habit of growth and color of foliage. Among trees not allied to the conifers to which the name cedar is given are species of Cedrela, which furnish the wood from which cigar-boxes are so extensively made. The Australian cedar is of the same genus, the species being *Cedrela toona* or *Cedrela Australis.* This is an important timber-tree which is put to many uses. It yields gum, a resin, and tanbark, in addition to timber. This or a similar species is found in India. The cedarwood of Guiana is from *Protium altissimum.* In Australia *Melia composita* is called white cedar.

CEDAR, BARBADOES (*Cedrela odorata*). A tree of the order Cedrelaceæ, and of the same genus with the toona, a native of the West Indies and warm parts of America. It is called cedar in the West Indies. It is often upward of 80 feet high, with a trunk remarkable for thickness. It has panicles of flowers resembling those of the hyacinth. The fruit, bark, and leaves have the smell of asafœtida, but the wood has an agreeable fragrance. Being soft and light, it is used for canoes and for shingles. Cigar-boxes are very generally made of it, and it supplies some of the wood used in the manufacture of lead-pencils.

CEDAR-APPLES. Outgrowths of frequent occurrence upon the red cedar or juniper. They are caused by a fungus, *Gymnosporangium macropus.* (For illustration, see FUNGI.) During most of the season they may be seen as warts or knots of greater or less size on the twigs. At first they have about the same color as the branch, but later become brown. In the spring of the year they undergo a marked transformation, and appear as horn-shaped masses of orange or yellow-colored jelly. These contain the spores of the fungus, and upon drying they are blown about. Lighting upon an apple-tree, they cause apple-rust. See, also, *Apple Diseases,* under APPLE.

CEDAR-BIRD, or CHERRY-BIRD. See WAXWING.

CEDAR CREEK. A stream in Shenandoah County, Va., falling into the Shenandoah River. On its banks, on October 19, 1864, during the Civil War, a Confederate force under General Early completely surprised Sheridan's army at daybreak, during its leader's absence, and forced it to retreat in considerable disorder back through Middletown; but about 10 o'clock the cavalry and part of Wright's corps (the Sixth) succeeded in checking the advance of the Confederates. General Sheridan, who was just returning from Washington, was at Winchester when the firing began, but hastened to the front, and, rallying his troops, ordered a countercharge at about 4 o'clock in the afternoon. Many of the Confederates had left their ranks to plunder the Federal camp, and in turn they broke and fled and were pursued as far as Fisher's Hill. Next day the retreat was continued to New Market. Sheridan's forces then returned to Kernstown for winter quarters. Sheridan had about 31,000 troops, and Early 18,500. The Federal loss was 644 killed, 3430 wounded, 1590 missing; the Confederate, 320 killed, 1540 wounded, 1050 missing. Sheridan recaptured his lost guns and 23 of Early's. This battle ended the last attempt on the part of the Confederates to strike the North through the Shenandoah Valley. Sheridan's famous ride from Winchester, his enthusiastic reception at the hands of his troops, and his remarkable success in turning a disastrous rout into a brilliant victory, form, perhaps, the most dramatic episode of the Civil War. They have furnished the theme of a stirring poem by T. Buchanan Read, "Sheridan's Ride." Consult Pond, *The Shenandoah Valley in 1864* (New York, 1883); and Sheridan, *Personal Memoirs* (3 vols., New York, 1888).

CEDAR FALLS. A city in Black Hawk County, Iowa, 100 miles west of Dubuque, on Cedar River, and on the Illinois Central, the Burlington, Cedar Rapids and Northern, and the Chicago and Great Western railroads (Map: Iowa, E 2). It is a manufacturing place of importance, having good water-power, and possesses flour, feed, oatmeal, pearl barley, paper, and planing mills, clothing-factories, corn-canning works, foundry, house-furnishing factory, feeder and stacker works, etc. The city has a public library, State normal library, and two parks, and is the seat of a State normal school, with 2000 students. Settled in 1845, Cedar Falls was first incorporated as a village in 1853. At present it is governed under the charter of 1865, which provides for a mayor, elected every two years, and a city council. Population, in 1890, 3459; in 1900, 5319.

CEDAR KEYS. A town and seaport in Levy County, Fla., on a small island just off the coast in the Gulf of Mexico, and on the Florida Central and Peninsular Railroad (Map: Florida, E 2). The harbor, which admits vessels of light draught, is formed by several small keys, on one of which is a tall lighthouse with a revolving light. The town has several sawmills, most of which cut red cedar wood for pencils, which is a leading export. It has a considerable trade also in fish, oysters, sponges, and lumber. Population, in 1900, 739.

CEDAR MOUNTAIN. A hill in Culpeper County, Va., near which on August 9, 1862, a sharp battle was fought between 8000 Federals of Pope's army, under General Banks, and about 24,000 Confederates under General Jackson. Banks gained a slight advantage at first, but was swept from the field by the spirited attack of Jackson's reserves. Pope's whole force advancing, Jackson fell back toward Gordonsville to join General Lee. The reported losses were, for the Federals, 1661 killed and wounded and 723 missing; for the Confederates, 1283 killed and wounded and 31 missing. It was the first serious engagement fought by the Army of Virginia under Pope. Consult Ropes, *The Army Under Pope* (New York, 1881).

CEDAR MOUNTAINS. A mountain range of southwest Cape Colony, South Africa, lying parallel with the Atlantic, and separating the valley of the Olifants River on the west from its tributary the Doorn on the east. The highest summit is Sneeuwkop, about 6300 feet altitude.

CEDAR OF GO′A. See Cypress.

CEDAR RAPIDS. A city of Linn County, Iowa, 79 miles southwest of Dubuque, on the Cedar River, and on the Burlington, Cedar Rapids and Northern, the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, and the Illinois Central railroads (Map: Iowa, F 3). The city, which lies in a rich agricultural country, has extensive wholesale houses and pork-packing establishments, and large railroad machine-shops. The manufacturing plants include oatmeal, barley, and flour mills, foundries and machine-shops, breweries, woolen-mills, agricultural-implement works, carriage-factories, etc. The rapids furnish water-power for many factories. Cedar Rapids is the seat of the Coe College (Presbyterian), founded 1881, and has public and Masonic libraries, a Masonic temple, Government building, auditorium, opera-house, park, and the Holly system of water-works. Several bridges, including four railroad bridges, cross the river at this point. Settled in 1845, Cedar Rapids was incorporated in 1856. It is governed under a charter of that year, revised in 1898, which provides for a mayor who holds office for two years, and a city council, most of whose members are elected by wards. With the mayor rests the appointment of all police officers, and with the council, the election of city engineer, attorney, street commissioner, and president of the council; the executive and council select the city auditor and board of review; other offices are filled by popular election. Population, in 1880, 10,104; in 1890, 18,020; in 1900, 25,656.

CEDAR, or RED CEDAR, RIVER. A river rising in Freeborn and Mower counties, southern Minnesota (Map: Minnesota, F 7). It flows southeast across Iowa from the northern to the southeastern boundary, emptying into the Iowa River at Columbus Junction, Louisa County, about 30 miles above where the latter stream joins the Mississippi. It is about 275 miles long and drains a beautiful and fertile region. The chief cities along its course are Waterloo, Vinton, and Cedar Rapids.

CE′DARTOWN. A town and the county-seat of Polk County, Ga., 60 miles northwest of Atlanta, on the Central of Georgia Railroad, and the East and West Railroad of Alabama (Map: Georgia, A 1). Cedar and pine timber and valuable mineral deposits are found in the vicinity, and the town has lumber-yards, cotton-mills, foundries, iron-mines, and other industries. Population, in 1890, 1625; in 1900, 2823.

CEDD, kĕd, or **CEDDA,** kĕd′dȧ, Saint (?-664). A brother of Saint Chad or Ceadda, with whom he is often confused. He was born in Northumbria; brought up by Bishop Aidan; Christianized Essex and other parts of England; was made Bishop of the East Saxons (654); founded two monasteries, and was famed in Britain and Ireland for learning and sanctity. He took the Roman side respecting the observance of Easter. He died in the monastery at Lastingham, a village about 25 miles northeast of York, October 26, 664. His day is January 7.

CEDIL′LA. See Diacritical Marks.

CEDRIC OF ROTHERWOOD, kĕd′rĭk, rŏth′ẽr-wụd, or Cedric the Saxon. Rowena's guardian in Scott's *Ivanhoe.* In his desire to restore a Saxon dynasty to England, he seeks the marriage of his ward with Athelstane; but is prevented therefrom alike by the accession of Cœur-de-Lion, the softened chivalry of Athelstane, and the love of Rowena for Ivanhoe.

CEDROS, sā′thrôs, or **CERROS,** sĕr′rôs. An island of Mexico, situated in the Pacific off the west coast of Lower California, where it forms part of the western boundary of San Sebastian Viscaino Bay (Map: Mexico, H 5). It lies between latitudes 28° 5′ and 28° 35′ N. Its total area is estimated at 120 square miles. The surface is mountainous and partly barren. The climate is dry. Mineral deposits of importance are supposed to exist.

CÉDULA, thā′dōō-lȧ (obsolete Engl. *cedule,* Fr. *cédule,* It. *cedola, cedula,* whence Ger. *Zettel,* slip of paper; variant of *schedule,* OF. *schedule, scedule, cedule,* from Lat. *schedula,* small sheet of paper, from *scheda,* sheet of paper, from *scindere,* to split). In Spanish, a written or printed paper of any sort, including blank forms. In Spanish law, any kind of a legal document, public or private, the exact nature of the document being indicated by supplementary words; e.g. *cédula real,* a royal order promulgating a law or decree; *cédula hipotecaria,* a mortgage loan certificate; *cédula ante diem,* a summons to a meeting of a society.

Cédula personal is a certificate of identification. Under the Spanish régime every inhabitant or resident of the Philippine Islands was required to take out, annually, such a certificate, and (unless legally exempt) to pay for it at a rate varying, according to his resources, from two pesos to 37.50 pesos. The graduated poll tax thus established yielded an annual revenue of 7,000,000 pesos. The American military government found it necessary, for administrative purposes, to retain the *cédula personal,* but decided to issue it at the nominal and uniform rate of one peseta.

CEFALÚ, chā′fȧ-lōō′ (anc. Lat. *Cephaloedium*). An episcopal city and seaport in north Sicily, 42 miles east by south of Palermo (Map: Italy, J 2). It is grouped around the cathedral begun by Roger II. in the Twelfth Century. Its mosaics are the most ancient and perfect in Sicily, and resemble those at Mount Athos. The town lies at the base of the steep limestone promontory which towers to the height of over 1200 feet, and which bears the ruins of the ancient town. Fisheries and commerce are engaged in by the inhabitants. Population, in 1881 (commune), 14,000; in 1901, 13,273.

CEGLIE MESSAPICA, chā′lyā mĕs′sȧ-pē′kȧ. A city in south Italy, 18 miles northeast of Taranto (Map: Italy, M 7). It markets large quantities of wine, fruit, and oil, and quarries stone. Population, in 1881 (commune), 15,000; in 1901, 16,867.

CEHEGÍN, thā′â-nēɴ′. A town of Spain, in the Province of Murcia, 37 miles west-northwest of the city of that name (Map: Spain, E 3). It has some spacious streets, with handsome buildings. The town is in a fertile region, has a trade in grain, oil, wine, fruits, etc., and has manufactures of paper, cloth, and pottery. Population, in 1900, 11,523.

CEILING (OF., Fr. *ciel*, Lat. *cælum*, sky). The material, of light description, used to make the inner covering of a room or other inclosed space; and, by extension, the surface forming this top covering, whatever may be its material. It is usual to apply the term to flat or nearly flat covering surfaces, and not to call the curved inner surface of a vault or dome a ceiling, although this is not a scientific restriction.

In Egyptian temples the flat stone roofs were used as symbols of heaven and painted blue, with yellow stars, bands of hieroglyphs, emblems and figures of gods, of the planets, the zodiac, and other heavenly scenes, in color. The heavy arched ceilings of Babylon and Assyria were stuccoed and painted, and apparently gilding was used in the sanctuaries. The flat ceilings of Greek art were largely coffered and the wood-surfaces were brilliantly painted, but with ornaments, not figures. Roman ceiling-decoration combined to perfection both types—the flat and the curved surfaces. The pictorial sense of Græco-Roman artists seized on the decorative possibilities of the ceiling. From the great domes, tunnel-vaults, and groin-vaults of the imperial baths and the flat ceilings of the temples and basilicas, down to the minor ceilings of tombs and private houses, all were covered according to one of three systems: (1) the coffered and paneled ceiling, used both on flat and curved surfaces; (2) the stucco reliefs, mainly on curved surfaces; (3) the decoration by simple painting, also on curved surfaces, in what we choose popularly to call the 'Pompeian' style. The stuccoed ceilings of the Pompeian baths, of the tombs on the Via Latina, and of the 'Farnesina' house in Rome, show the exquisite taste and dash of these facile works. The elaborate painted ceilings of the Baths of Titus, discovered in the Sixteenth Century, furnished the models for the arabesques and grotesques which Raphael made so popular in his Vatican *Loggie*, and which have been ever since in continual use. With the fall of Roman art, ceiling decoration disappeared entirely in the West, to be revived only after six centuries in the Romanesque period. But in the Orient there was no such intermission. On the contrary, Byzantine art with its discovery of marble, glass, and mosaic incrustation as a covering for the surfaces of vaults, added a hitherto unknown element of deep and rich color, which gave a mysterious diffusive effect to the ceilings; and this was helped by its use of curved ceilings wherever possible, even in civil structures. Such are the domes of the Ravenna baptisteries, of Saint Mark's in Venice, and the churches of Salonica and Constantinople. It strikes a note of seriousness in contrast to the playfulness of Roman decoration. One important fact is that Byzantine ceiling decoration is never in relief—always an unbroken surface. This same ideal—of curves and of deep surface-coloring—was developed by Mohammedan art; but in the buildings erected in the Mohammedan style there were few unbroken lines and surfaces. So we have the stalactite corbeling and geometric surface decoration combined with brilliant coloring—more brilliant than that of the Byzantine. When, in the West, mediæval art gave up its severe simplicity of open roofs showing the beams and rafters, and took again to decorative wood in ceilings, as well as to vaulting, the decoration of ceilings took two principal forms. Setting aside mosaics, which were used only—and then seldom—in Italy; paneled and coffered ceilings, which were not revived until the Renaissance; and stuccoed ceilings in relief, which were never revived at all; there remained: (1) painted ceilings; (2) timbered ceilings. In churches the vaulting had frequently a blue ground, as a symbol of the heavenly vault, and its surfaces were as completely covered with subjects of religious art as were the walls. The commonest mediæval vault was the groin vault, and its groins or ribs generally formed the dividing lines in the decoration, as in Saint Francis at Assisi. The more architectural decoration of mediæval ceiling surfaces is described under Vaulting. These ceilings of painted masonry, being exceedingly durable, have been preserved in great numbers; but of the wooden timbered ceilings, usually carved and painted, with picturesque play of light and shade, there are extant but a few early examples—as the Capella Palatina in Palermo and Saint Michael's in Hildesheim (Twelfth Century). They became numerous only in the latest Gothic period, and the Fifteenth and Sixteenth centuries are their Golden Age in the north of Europe. Superb examples exist in England from the Elizabethan Age. Meanwhile the Italian Renaissance had evolved an interesting type of flat beveled ceilings for its palace halls, which the frescoists decorated with all the skill of masters in perspective. Their designs of the Sixteenth and Seventeenth centuries were especially charming and were copied in France. Even such famous paintings as Guido's "Aurora" were among them. Correggio and his school were famous 'illusionists' in ceiling frescoes.

CEILLIER, sā'yā', Rémy (1688-1761). A French Benedictine scholar. He was born in Bar-le-Duc, France, became titular prior of the Benedictine monastery of Flavigny, near Nancy, and there died. His enduring fame rests upon his laborious and exhaustive analysis of ecclesiastical literature down to the middle of the Thirteenth Century, *Histoire générale des auteurs sacrés et ecclésiastiques* (1729-63, 23 vols.; new edit. 1858-65, 14 vols.).

CEL'ADON (Lat., from Gk. Κελαδών, *Keladōn*). The Romeo of French classic drama and the Corydon of the English bucolic. In particular: (1) The hero of d'Urfé's *Astrée*. (2) A rural character in Thomson's *Seasons*. (3) A fickle gallant in Dryden's *Secret Love*.

CELÆ'NO. The name of one of the Harpies in Greek mythology.

ČELAKOVSKÝ, chă'lă-kŏv'skê, František Ladislav (1799-1852). A Czech poet and Panslavist. He was born in Strakonitz, and was educated at the University of Prague. He exercised a considerable influence upon the development of Czech literature, made numerous translations from the German, Russian, and English, and published a large number of poetic and other works, among which are the following: *Echoes of Russian Songs* (1829); *Echoes of Bohemian Folksongs* (1840); *The Centifolious Rose* (1840), a cycle of didactic, political, and love poems.

ČELAKOVSKÝ, Ladislav (1834-1902). An Austrian botanist, son of the preceding. He was born and educated in Prague, and in 1860 was appointed custodian of the botanical department in the Bohemian Museum in that city. In 1882 he became professor of botany at the Czech University of Prague. Among his numerous and valuable works are the following: *Prodromus der Flora von Böhmen* (1867-81); *Ueber die morphologische Bedeutung der Samenknospen* (1874); *Die Gymnospermen* (1890); *Das Reduktionsgesetz der Blüten* (1895).

CEL'ANDINE (OF. *celidoine*, Fr. *chélidoine*, Lat. *chelidonia*, from Gk. χελιδόνιον, *chelidonion*, swallow-wort, from χελιδών, *chelidōn*, swallow), *Chelidonium*. A genus of plants of the order Papaveraceæ (the poppy family), having a corolla of four petals, and a podlike capsule. The common celandine (*Chelidonium majus*) is a perennial, with pinnate leaves, lobed leaflets, and yellow flowers in simple umbels, frequent under hedges, in waste places, etc., in Great Britain and most parts of Europe. It is also introduced in various places in the United States. It flowers from May to September. The root, stem, and leaves, when fresh, have a disagreeable smell, and are full of a yellow juice, which is very acrid, causing inflammation when applied to the skin. Celandine is sometimes used in medicine; it is a drastic purgative, and in large doses an active poison: in small doses it is said to act beneficially on the lymphatic system and on the organs of secretion, and to be useful in jaundice, scrofulous diseases, disease of the mesenteric glands, etc. The most prominent constituents of the plant are sanguinarin, chelerythrin, chelidonin, protopin, chelidoxanthin, and chelidonic acid.

CELANO, chȧ-lä'nō. A town in the Province of Aquila degli Abruzzi, South Italy, picturesquely situated on a hill at the north end of Lake Fucino (q.v.), the ancient Lacus Fucinus. It was the seat of a count and a place of importance prior to 1223, when it was devastated by Frederick II. The castle, founded in 1450, was the prison of Countess Covella, who was there immured by her son Rugierotto. The author of *Dies iræ, dies illa*, Beato Tommaso, was born in Celano. Population (commune), in 1901, 9904.

CELAS'TRUS. See WAXWORK.

CELAYA, sȧ-lä'yȧ. A city in the State of Guanajuato, Mexico, 34 miles south of San Miguel de Allende, on the Rio Grande de San Jago, at the junction of the Mexican Central and Mexican National railroads (Map: Mexico, J 7). It has a fine public square and the splendid church of Our Lady of Carmen, completed in 1798, which has a portico with handsome Corinthian columns and a spacious interior in the form of a Latin cross. The city manufactures soap, woolen goods, and saddles, and is noted for its candies. Near the city are thermal springs. Celaya was founded in 1570, and in 1655 was raised to the dignity of a city. It was sacked by the Revolutionists in 1810. Population, in 1895, 21,245.

CEL'EBES (the name of a native tribe). One of the larger islands of the Dutch East Indies, situated east of Borneo between latitudes 1° 45′ N. and 5° 45′ S., and between longitudes 118° 49′ and 125° 5′ E (East Indies, F 5). It is surrounded by the Celebes Sea on the north, the Molucca Sea on the east, the Flores Sea on the south, and the Strait of Macassar on the west. Its area is estimated at about 71,000 square miles.

In its shape Celebes is not unlike a starfish, the same general form being found also in the adjacent island of Gilolo. It consists of four mountainous peninsulas, of which the northern, Menado, has a length of about 400 miles. The surface is largely mountainous and reaches its highest elevation in Mount Bonthain, an extinct volcano, situated in the southern part of the island and exceeding in altitude 9500 feet. There are also a number of active volcanoes in the eastern end of the peninsula of Menado, ranging in altitude from 5000 to over 8000 feet. The largest river is the Sadang, which rises in the central part of the island and flows through the southern peninsula. Lakes are abundant, and hot springs also are found. The western coast is practically without any indentation, while the eastern coast forms the three spacious inlets of Tomini, Tomori, and Boni.

The climate is tropical, but somewhat modified by the elevation of the surface. The rainfall is more abundant in the north than in the rest of the island. Lying in the centre of the Indian Archipelago, Celebes has a great tropical variety and wealth of both fauna and flora. Among the animals peculiar to the island are the tailless baboon, the babirussa, with double tusks and recurved horns rising out of the head midway between snout and eyes, the marsupial cuscus, and the sapi-outan or wild cow, besides several species of small birds. Deer, wild and tame buffaloes, wild swine, sheep, goats, etc., abound, and monkeys are innumerable. The forests include oak, teak, palm, cedar, and upas trees, while the bamboo, which furnishes material for habitations and every sort of implement, and even articles of dress, is everywhere found. Cloves, nutmeg, spices, the tropical fruits, maize, rice, tobacco, sugar, and indigo are easily raised. The geological composition of Celebes is only slightly known. The larger part is probably composed of sandstone and limestone, while the northern peninsula of Menado is of volcanic origin. The minerals of Celebes are gold, iron, salt, copper, zinc, and coal. The coal, however, is of poor quality. The gold is in quartz veins, and occurs in deposits of sufficient richness to reward the mining companies, of which there are several.

For administrative purposes, the northern arm, Menado (and Minahasa) is organized, with the Sangir and Talaut islands, into Residency No. XII., while the west, centre, and south of Celebes, with Sumbawa and other islands, are included in Residency No. XI. of Insulinde or Island India. Residency No. XIII. includes eastern Celebes, Gilolo, and the Moluccas and other islands between Celebes and New Guinea. The princes of Celebes have pretty much their own way, being little interfered with by their Dutch residents as long as they pay tribute or bring forward the crops or forest products. Dutch missionary operations have been very successful in this island. The coffee plantations established on the mountain slopes by the Dutch about eighty years ago, together with the revival of cacao culture, have brought much wealth to the natives and their masters. No part of Insulinde has shown better the results of peace, good government, and missionary operations than certain portions of Celebes, especially Minahasa. Of late years, apart from the business of the Government, the imports in the ports, not including Macassar, have averaged over $3,000,000 and the exports over $3,580,000, the commerce of the port of Macassar reaching an annual total of $6,400,000. The chief towns of the island are Macassar, Menado, and Gorontalo.

The population of the island is estimated at 2,000,000, including about 2400 Europeans. The native inhabitants are of various origins and characteristics, their ancestors having emigrated from other islands. The most noteworthy peoples are the Minahasans in the north, the Macassars (properly Mangkasars) and Bugis in the south, while in the interior and toward the north dwell tribes of the so-called 'Alfurus' (really only a more primitive or proto-Malayan type, with, perhaps, some negroid strain). The Macassars are the most highly developed of these people, being of Malay origin, well built and muscular, with good complexions and bright eyes, brave, ambitious, temperate, industrious, and skillful hunters, but given at times to revenge, to gambling, and to cock-fighting. They make good soldiers, but, despite all the Dutch have done to prevent it, the habit of running amuck is common. Their religion is Mohammedanism, much degraded by local superstitions and beast-worship, and the abject fear of a local deity. Many are skillful craftsmen and excel in native manufactures, especially rich personal adornments. They have a literature, chiefly romance and drama, besides works of religion and law, translated from the Arabic and originally brought to them by the missionaries of Islam. In Menado thirty-six tribes were confederated, under Dutch direction, against an aggressive chief, and it is among these people, especially the Minahasans, that Dutch civilization has accomplished valuable results. The Wadjus are an interesting tribe and active in trade. By language, all belong (some more or less remotely) to the Malayan stock. The Javanese appear to have exerted not a little influence upon the southern portions of Celebes, and certain Hindu traces are also due to them as intermediaries. The women of Celebes are celebrated for the fine bark-cloth made by them. Celebes has furnished many settlers for other regions of the Malay Archipelago, the Bugis, in particular, being great travelers and colonizers, merchants, and seamen. The island was first discovered and named by the Portuguese in 1512, but from about 1607 the Dutch gradually obtained the supremacy, though it was not until well into the Nineteenth Century that every district was under their control.

Consult: Lahure, *L'île de Célebes* (Paris, 1879); Wallace, *The Malay Archipelago* (London, 1880); van der Lith, *Nederlandsch Oost-Indie*, Vol. I.; Hickson, *A Naturalist in North Celebes* (London, 1889); Staden der Brink, *Zuid-Celebes* (Utrecht, 1884).

CE'LER. One of the two architects—the other one is Severus—mentioned by Tacitus as employed by the Emperor Nero in his great constructive works. They undoubtedly carried out Nero's scheme for a general reconstruction of Rome on a regular plan after the great fire, and were the architects of his colossal 'Golden House,' the most immense of all imperial palaces, which swallowed up a large quarter of the city.

CEL'ERES (Lat., pl. of *celer*, rapid, Gk. κέλης, *kelēs*, racer, Skt. *kal*, to drive). A bodyguard of 300 young men of the best Roman families, organized, according to tradition, by Romulus. Next to the King, their leader was the highest officer of the State. This position was held by Brutus when he expelled the Tarquins.

CELERY (Fr. *céleri*, Lat. *selinon*, parsley, from Gk. *σέλινον*, *selinon*, parsley) *Apium graveolens*). A biennial plant of the natural order Umbelliferæ, a native of Europe, now widely cultivated for its leafstalks, which are blanched and eaten raw with salt. One form, celeriac, is extensively grown on the Continent of Europe for its turnip-like root. The whole plant has an aromatic flavor.

The celery industry has had a rapid development in the United States during recent years, owing largely to improved methods of culture. The method now in general use is to sow the seed in a hotbed, or for the late crop, in the open, transplant once or twice, and set in the field in level rows three or four feet apart and six inches distant in the row. The stalks are blanched by heaping earth against the plants, setting up boards about a foot wide against the row on either side, or by wrapping the plants with paper or other material. In the so-called 'new celery culture' the rows are only 6 to 12 inches apart. The plants thus thickly grown are self-blanched and only the outside rows need protection from the light. Celery intended for summer or fall use is blanched when the plants are well grown; that grown for winter use is taken up when cold weather comes on and set in pits or a cool cellar, the roots being packed in moist earth so that the plants may continue a slow growth while blanching. Celery is generally grown on a moist, rich, peaty soil, well drained and heavily fertilized; but good crops have been grown on fertile clayey and sandy uplands. The crop requires an abundance of moisture and fertilizer. *Celeriac*, or the root form of celery, is handled about like celery, except that it does not require blanching. It is little grown in America except where there is a German settlement. It is cooked and eaten with sauce, used in salads, and pickled. For illustration, see Plate of SALAD PLANTS.

Some sixty varieties of celery are cultivated in the United States. Some are dwarf varieties, scarce a foot high, while others grow nearly three feet high. The leaves may be green, white, or yellow. Paris Golden or Golden Self-Blanching, White Plume, Giant Pascal, and Boston Market are among the varieties that are most extensively grown.

CELERY DISEASES. Celery is subject to a number of destructive parasitic diseases. The rust or sun-scald, due to *Cercospora apii*, is recognized by the gray or yellow spots upon the leaves. The spots enlarge, run together, and finally destroy the leaf. The disease is more prevalent in dry situations than in moist ones, and where celery is grown in very dry soils it should be given some shade to prevent this disease. A leaf-blight, caused by *Septoria petroselina apii*, attacks all parts of the plant above the ground, causing watery spots on stems and leaves. Black dots soon appear in these areas and the spores are widely scattered. Attention should be given to plants when setting them out that no diseased ones are used. If the plants are sound when planted, any good fungicide (q.v.) will prevent the spread of either of the above diseases. A bacterial disease is said to attack some varieties, causing their stalks to become watery and worthless. It also spreads in market, quickly causing the hearts to melt away into a slimy, worthless mass. In the market, celery should be kept very dry or else completely submerged in water to prevent this loss.

Consult: Duggar and Bailey, "Notes Upon Celery," in Cornell University Agricultural Experiment Station *Bulletin 132* (Ithaca, 1897); Massey, "Growing Celery in the South," in North Carolina Agricultural Experiment Station *Bulletin 83* (Raleigh, 1892).

CELESTIAL CITY. In Bunyan's *Pilgrim's Progress*, the goal of the pilgrim's journey, which was reached by passing through the River of Death.

CELESTIAL EMPIRE, The. An appellation for China, suggested by the title 'Tien Chao' (Heavenly Dynasty), which the Chinese give to their country; whence, also, the term *Celestials*, often popularly applied to the population. See China.

CELESTINA, thā'lĕs-tē'nȧ. A Spanish prose drama in twenty-one acts, originally entitled *The Tragi-Comedy of Calisto and Melibea*, probably begun by Rodrigo Cota, of Toledo, about the middle of the Fifteenth Century. It was finished by Fernando de Rojas, and appeared about 1480. Consult Ticknor, *Spanish Literature* (Boston, 1863).

CEL'ESTINE (Lat. *cœlestis*, of the sky, then blue, from *cælum*, sky). A strontium sulphate that crystallizes in the orthorhombic system. It is of a white color, though usually with a faint blue tinge (from which it derives its name) and rarely reddish. The finest crystals are those from Girgenti in Sicily, where it is found with sulphur and gypsum, and from the Put-in-Bay Islands in Lake Erie. It has considerable commercial value as a source of strontium, many of whose salts are used for producing a red light in fireworks. *Barytocelestite* is a variety containing barium, and *calciocelestite* is a variety containing calcium.

CELESTINE. The name of five popes. (1) Celestine I., Pope 422-32, is supposed to have been a near relative of the Emperor Valentinian. Tradition attributes to him the addition to the Angelical Salutation: *Sancta Maria, Mater Dei, ora pro nobis.* He sent Palladius to Ireland as the first bishop of that country. (2) Celestine II. (Guido di Castello), Pope 1143-44. He gave absolution to Louis VII. of France, on the King's humble subjection, and removed the Papal interdict from that country. (3) Celestine III. (Giacinto Bobone Orsini), Pope 1191-98. He is supposed to have been 85 years old when chosen. He crowned the Emperor Henry VI. of Germany, and subsequently excommunicated him for keeping Richard I. of England in prison. In 1192 he confirmed the statutes of the Teutonic Order of Knights. (4) Celestine IV. (Goffredo Castiglione of Milan). A nephew of Urban III. He was elected Pope by only seven cardinals, October 25, 1241, and died November 10 of the same year. He was the author of a history of Scotland, in which country he was once a monk. (5) Celestine V. (Pietro di Morone), Pope in 1294. He was the son of a peasant of Naples, became a Benedictine monk, and lived many years in caves, after the manner of John the Baptist. Terrible stories are told of the severity of his penitential discipline. During his hermit life he founded the order that bears his name. (See Celestines.) After the death of Nicholas IV. he was elected Pope, but refused to accept until persuaded by a deputation of cardinals, reinforced by the Kings of Naples and Hungary. He was chosen July 7, 1294, and was crowned August 29. He issued two decrees, one confirming that of Gregory X. ordering the shutting up of the cardinals when in conclave, and one declaring the right of any Pope to abdicate at pleasure — a right which, after ruling five months and eight days, he exercised himself, December 13, 1294. In his document of renunciation he assigned as the moving causes "the desire for humility, for a purer life, for a stainless conscience; the deficiencies of his own physical strength; his ignorance; the perverseness of the people, and his longing for the tranquillity of his former life." Having divested himself of every outward symbol of dignity, he returned to his old solitude; but he was not permitted to remain. His successor, Boniface VIII., sent for him, and, fearing a schism on his behalf, confined him, though with great respect, in the castle of Fumone, where after ten months he died, May 19, 1296. He was canonized in 1313. Yet Dante did not hesitate to put him in hell, though at the entrance, because he had abdicated: "I looked, and I beheld the shade of him who made through cowardice the great refusal" (*Inferno*, iii.; and cf. xxvii).

CELESTINES. A congregation within the Benedictine Order, founded by Pietro di Morone about 1254, and confirmed by Urban IV. in 1264 and 1274. They were known at first as Hermits of Saint Damian, but called themselves Celestines when their founder ascended the Papal chair under the name of Celestine V. They wear a white garment with black hood and scapular, and live a purely contemplative life. In the Thirteenth and Fourteenth centuries the order rapidly spread through France, Italy, and Germany, but subsequently decayed. The German convents were mostly destroyed by the Reformation, and the French by the Revolution. At the present day the order is almost extinct.

CE'LIA. (1) Mother of Faith, Hope, and Charity in Spenser's *Faerie Queene*. (2) Daughter of the usurper Frederick, and devoted cousin of Rosalind, in Shakespeare's *As You Like It*. (3) The heroine of *The Humorous Lieutenant*, by Beaumont and Fletcher, who receives addresses from Antigonus, and Demetrius, his son, and finally proves to be Enanthe, the daughter of Seleucis. She is happily married to Demetrius. (4) The chaste wife of Corvino (q.v.) in Jonson's *Volpone*, whom her fortune-seeking husband sends to 'the Fox's' embraces. (5) A young girl in Whitehead's *School for Lovers*.

CEL'IBACY (from *celibate*, Fr. *célibat*, Lat. *cælibatus*, celibacy, from *cælebs*, bachelor). In ecclesiastical history, the abstention from the married state by the clergy and those who have entered upon the monastic life. The Roman Catholic Church requires celibacy on the part of its clergy as a part of its ecclesiastical discipline. It holds that this practice is of Apostolic origin, basing this claim upon what it avers to have been the constant tradition of the

Church, and upon several biblical texts. Catholic writers make a careful distinction between the principles upon which the law of celibacy is founded and the changes which have taken place in its application. These principles are: (1) That the clergy may serve God with more freedom and with undivided heart, and (2) that being called to the altar, they may embrace the holier life of continence. This does not imply, it is declared, that matrimony is not a holy state, but simply that celibacy is a state of greater perfection. Matt. xix. 12, I. Cor. vii. 32-40, and Rev. xiv. 4 are cited in support of this contention: while the reference in I. Tim. iv. 3 is taken as clearly directed against Manichæan reprobation of marriage in general. It does not follow, however, that the Church is absolutely bound to impose a law of celibacy upon its clergy.

In Apostolic times there seems to have been no legislation in regard to clerical celibacy, save in the one instance in which it was required of a bishop that he should have been only once married. In the Second Century the veneration for the virginal life had become widespread, and a continent life for the clergy was regarded as proper to the ecclesiastical office, at least in its major orders. The rule for clerics not to marry after ordination seems to have been in force from very early times, for we find Paphnutius, an Egyptian bishop at the Council of Nicæa (325), while resisting the imposition of a law of continence upon all clerics, declaring the ancient traditional law forbidding clerics to marry after ordination to be sufficient. That this was the recognized practice of the early Church seems well established. The Apostolic Constitutions forbid bishops, priests, and deacons to marry, and the twenty-seventh Apostolic canon contains the same prohibition. The Council of Neo-Cæsarea (between 314 and 325) decreed that a priest who married after ordination should be degraded to the lay state. A deacon could marry only if he had stipulated for such liberty at the time of his ordination, as provided for by the Council of Ancyra in 314. The Council of Elvira (305) legislated against the marriage of all those who served the altar in any way, requiring of bishops, priests, and minor clerics a life of continence, even if they had been already married. It was the application of this law throughout the entire Church against which Paphnutius protested at the Council of Nicæa. Nevertheless, it soon afterwards prevailed in the West. We find it so declared in a letter of Pope Siricius (384), addressed to Himerius, Bishop of Tarragona. The Third Synod of Carthage (397) embodied it in its canons. Pope Innocent I. laid it down in his letter to Exuperius, Bishop of Toulouse, who had consulted him in regard to it. Saint Jerome (*against Jovinian*) declares that a priest who has "always to offer sacrifice for the people must pray, and therefore always abstain from marriage." Leo, and Gregory the Great, and the Eighth Council of Toledo renewed the prohibitions against the marriage of subdeacons.

The strict enforcement of the law of celibacy in the pontificate of Gregory VII. has occasioned much dispute. Protestant writers generally, such as Mosheim, Potter, and Ranke, condemn the action of Gregory as an innovation upon ancient discipline. Catholic writers defend this pontiff, and hold that Gregory's legislation was but the application of the ancient discipline with renewed vigor. There is no doubt that in Gregory's time concubinage was largely prevalent. His immediate predecessors, Leo IX., Nicholas II., and Alexander II., issued stringent decrees against it. But it was Gregory who most vigorously and successfully enforced this legislation. Priests living in concubinage were forbidden to say mass or even to serve at the altar; the faithful were warned not to hear their mass, and deposition was to be the punishment of priests who refused to obey. A series of synods from the beginning of the Twelfth Century declared the marriage of persons in holy orders to be not only unlawful, but invalid. It was now laid down that if persons in minor orders married they forfeited the privileges of the clerical state. However, Boniface VIII. (1300) permitted them to act as clerics, if they had been married only once and then to a virgin, had episcopal permission, and wore the habit of clerics. The Council of Trent renewed this law and again decreed the marriage of clerks in holy orders null and void. In the Western Church at the present time holy orders can be conferred on a married man only on the condition that his wife voluntarily and fully consents to a separation, and herself makes a vow of chastity.

The law of celibacy has never been so stringently applied in the East as in the West. Socrates (450) states that the same law of celibacy which prevailed among the Latins also obtained in Thessaly, Macedonia, and Achaia. In 620 the Trullan Synod enacted a decree which required married bishops to separate from their wives and forbade all clerics to marry after entering upon the subdiaconate. In the Ninth Century a law of Leo the Wise permitted subdeacons, deacons, and priests who had married after receiving orders to remain in the ranks of the clergy, but not to exercise any functions pertaining to their office save in matters of administration. The Russian Church has modified the ancient Greek canons prohibiting priests and deacons from marrying after ordination. Up to the time of Peter the Great a priestly widower was obliged to enter a monastery, but this monarch allowed a second marriage, and permitted the man to be employed in a seminary or episcopal chancery. Among the United Greeks, Ruthenians, Maronites, and such other followers of the Oriental rites, in communion with Rome, the following is the discipline: (1) A bishop cannot, after his consecration, either marry again or cohabit with the wife married before ordination. If he has a wife living she must retire to a distant nunnery, and there be supported by her late husband. (2) Priests and deacons may, in accordance with the Trullan canon, keep the wives taken before their ordination, but they must abstain from marital intercourse for some time before officiating at the altar. Pope Clement VIII. (1592-1605) ordered this abstinence to be if possible for seven, or at least for three days. (3) Priests and deacons cannot marry after ordination. Such was the decree of Benedict XIV. issued May 6, 1742. Any such attempt at marriage was pronounced null and void. But in the case of converts from schism who were already in holy orders, the same pontiff decreed that the Holy See might permit the retention of a wife taken after ordination.

Celibacy has no doctrinal bearing in the Roman Catholic Church, and is regarded as purely a disciplinary law, though as of prime importance in maintaining the character and dignity of the priesthood. Often a dispensation (q.v.) from the obligation of celibacy has been accorded to ecclesiastics under exceptional circumstances, which seemed to warrant a departure from the general law. These circumstances were very often connected with the necessity of providing heirs for noble families which were in danger of becoming extinct. Among others, the following may be mentioned: In 1040, Benedict IX. dispensed Casimir, a monk of Cluny, for the sake of the Polish succession. Constance, daughter of King Roger of Sicily, was dispensed from her vows as a nun by Celestine III. in 1191, in order to marry the Emperor Henry VI. In 1648 Innocent X. dispensed a Jesuit father, John Casimir, who had been elected King of Poland, from the obligation of celibacy in order again to preserve the succession. In modern days the only instance of a validation of priestly marriages is that by Pius VII. in the case of the French *Constitutionnels* (the priests who had accepted the civil constitution of the clergy and for a time had been practically separated from Rome), receiving back into regularity, on their submission, those who had married during the Revolution. Dispensations are quite numerous in cases of persons belonging to the military religious orders.

The rule has been, especially since the Reformation, consistently rejected by those who separated themselves from the Roman Catholic communion. Luther set the example to his followers by marrying a former nun; and both the marriage of ministers and the abolition of monastic vows became a common feature of those bodies which threw off their allegiance to Rome. The Church of England in its articles of religion laid down the proposition that "Bishops, priests, and deacons are not commanded by God's law, either to vow the estate of single life, or to abstain from marriage: therefore it is lawful for them, as for all other Christian men, to marry at their own discretion, as they shall judge the same to serve better to godliness." Consult: Zaccaria, *Storia polemica del celibato sacro* (Rome, 1774); Schmitt, *Der Priestercölibat* (Münster, 1870); Lea, *Historical Sketch of Sacerdotal Celibacy* (Philadelphia, 1886).

CÉLIMÈNE, sā'lė'mān'. The principal character in Molière's comedy *Le misanthrope*. She is a vain, worldly coquette who has been careful to rid herself of all womanly emotion or sentiment. She is looked upon, in the play, as the fiancée of Alceste, the 'misanthrope,' but receives addresses from Acaste and Clitandre, ignores her lover's protestations, refuses to go to the country and live simply and naturally, and is finally released by him in disgust. She is the traditional stage coquette, and probably suggested Millimant in Congreve's *Way of the World*, who is the stock artificial society woman in classic English drama.

CELI'NA. A village and the county-seat of Mercer County, Ohio, 95 miles southwest of Toledo, on the Grand Reservoir and on the Lake Erie and Western, the Cincinnati Northern, and other railroads (Map: Ohio, A 4). It has some manufacturing interests. Population, in 1890, 2702; in 1900, 2815.

CELL (Fr. *celle*, Lat. *cella*, Gk. *καλιά*, *kalia*, Skt. *śālā*, hut, connected with Lat. *celare*, to hide, Skt. *śaraṇa*, refuge). The general meaning, with the Romans as with us, was that of a storeroom or small apartment where objects of any kind were stowed away, though it does not denote a subterranean storeroom, like the English cellar. *Cella* was also used to denote the inner room of an ancient temple (like the Greek *ναός*), where the image of the god was placed. In modern architecture, the term vaulting cell signifies the hollow space between the principal ribs of a vaulted roof.

CELL. In early Christian usage, (1) a chapel erected over a tomb: or (2) a monastic dwelling either of a single monk or of a community subordinate to an abbey, and compelled to pay tithes to it. Its occupants were obliged to present themselves at the abbey at stated times.

CELL (in animals). The morphological and physiological visible unit of the body of organisms. It is essentially the same in plants and animals, and is usually of microscopic size. The yolk, or yellow, of a hen's egg is, however, one cell. The name cell is something of a misnomer, for it implies a wall-inclosed chamber. But though many cells, especially among plants, are provided with thick walls, these may be entirely absent, and, when present, are usually, in animals at least, exceedingly delicate. Consequently, we regard the cell-wall as of less importance than the cell-contents, which constitute the more active parts. The cell-content is known as protoplasm. The protoplasm consists of two main parts—a centrally placed, usually more or less spherical or ellipsoidal body called the nucleus, and the rest of the protoplasm, called cytoplasm. Nucleus and cytoplasm are each dependent on the other, and both are necessary to cell life. The nucleus is easily distinguished by the circumstance that it contains much substance which is easily stained by various dyes. This stainable substance is known as chromatin. The cytoplasm usually contains relatively large water-filled spaces, called vacuoles, and small particles of food-substance and other substances that are easily 'stained'—i.e. seize upon the coloring matter of dyestuffs when placed in them. In its general structure protoplasm consists typically of water and the truly vital substance called plasma. The plasma exists in a great variety of forms. Frequently it occurs in films surrounding little vesicles of water, as the films of foam surround air spaces, or as the wax of the honeycomb surrounds the honey. Sometimes it seems to extend in fine threads through the water-spaces. Still, again, the water-spaces may be almost entirely absent. The living, 'active' protoplasm seems to be constantly in motion, as can be judged by the motion of the particles which flow in the transparent current. Besides these particles, larger masses, such as drops of oil, pigment bodies, food-granules, and excretory bodies may be seen in the plasma or lodged in the water-spaces between the plasma-walls.

The cell-wall, or cell-membrane, is produced by the cell itself, usually by a transformation of its own substance. It is frequently, at least, to be regarded as still made up of living matter. In many cases, when the cell-wall is thick, it can be seen to be perforated to permit of the passage of films of protoplasm by which the adjacent cells are organically connected. In plants where a great weight has to be borne and great rigidity given, the cell-wall often gains a great thickness and constitutes the wood of the dead plant.

The *nucleus* is essential to the processes of assimilation and growth, and probably controls in these operations. While its general form is subspherical, it may become greatly elongated, lobed, branched, form a series like a string of beads, or appear as two bodies or even as a mass of chromatin, scattered throughout the cell. In the chromatin network lie the chromatic particles and certain larger bodies called nucleoli. There may be many nucleoli, or only one large one. The typical nucleolus is regarded as an excretion product which is eventually cast out of the nucleus. The plasm films separating the nucleus from the cytoplasm are usually very evident, and, taken together, constitute the so-called nuclear membrane. It is of course a living membrane. Outside of the nuclear membrane is often found a minute particle, the centrosome.

Cell Division.—The method by which the multicellular body is produced from the unicellular egg was long misunderstood. It was thought that cells crystallized out of a homogeneous matrix, or that new cells were formed inside of the preëxisting cells. It is now known that there is one process of cell-multiplication and one only—namely, division of a cell into two equal parts. This division involves all parts of the cell—cytoplasm, nucleus, and centrosome. The method of cell-division varies in different cases; two main types may, however, be distinguished — mitotic division or 'karyokinesis,' and amitotic division. The mitotic division seems to be the more usual type, so it may be first considered. For purposes of description, four series of stages or phases may be recognized: (1) The prophases, or preparatory changes; (2) the metaphase, or acme of the division process; (3) the anaphases, or aggregation of nuclear material at the centres; (4) the telophases, or those in which the cytoplasm divides and the two new nuclei are established.

(1) *Prophases.*—In the cytoplasm the centrosome becomes double, if not so already, and the two centres move apart. A set of radiations now make their appearance in the cytoplasm—the asters—having the centrosomes at their centres. Between the centrosomes the asters pass over into each other, making a spindle-shaped figure composed of lines — the karyokinetic spindle. At the same time changes are occurring in the nucleus. The chromatin, which has previously consisted of scattered particles, becomes condensed into a deeply staining thread, which is coiled as a twisted or spiral thread within the nuclear membrane (skein or spireme stage). Eventually this thick thread, from which the mitotic process takes its name (Gk. μίτος, a thread), breaks into a number of deeply staining rods (centrosomes). The number of centrosomes is believed to be constant in each species throughout the whole series of cell-divisions in the individual, and is always even. In the threadworm (Ascaris) there are 2 or 4 chromosomes; in certain liverworts, 8; in certain insects, 12, 16, 20, etc.; in the frog and mouse, 24; in the crustacean Artemia, 168; in man, probably 16. The nucleoli are either cast out into the cytoplasm or are gradually dissolved in place.

(2) *Metaphase.*—In this phase the spindle has come to lie in the equator of the nucleus, and the nuclear membrane has disappeared. Each chromosome splits lengthwise in equivalent parts, one-half of each going toward each pole. Consequently, each of the daughter nuclei receives exactly equivalent portions of the chromatic substance of the mother nucleus.

(3) *Anaphases.*—The separated parts of the chromosomes move to the two poles of the spindle, and these group themselves closely together. For a time the spindle fibres still persist as fine threads connecting the chromosomes, and in the middle of their course a plate of fine granules often appears lying across the fibres. The asters fade away and the process of nuclear division is accomplished.

(4) *Telophases.*—The whole cell now divides, the division plane passing through the plate of granules, which plate helps form the new cell-wall. The chromatophores seem to absorb water, swell up, press against each other, and form spherical nuclei. Alongside each nucleus is found the centrosome of the new cell. What are the purpose and the mechanism of mitosis? The purpose is quite certainly the exact division of the chromatic material. Concerning the mechanism there is still much difference of opinion. It seems probable that currents in the plasma films convey the chromosomes from each other and toward the opposite poles. The division of the cytoplasmic body may result from a centripetal flowing toward the centres of the two asters. But we are ignorant of the causes which determine the direction of flow.

Amitotic Division.—This consists of a constriction of a nucleus without any formation of chromosomes. After two nuclei are formed the cytoplasmic body may divide. The significance of amitosis is very uncertain. It is especially common among cells that are about to perish; it seems to be induced by peculiar conditions of the cytoplasm.

The History of the Cell Theory.—The first investigations into the finer structure of organisms were made by Malpighi and by Grew, at the end of the Sixteenth Century, upon plants. They discovered in them small, fluid-filled spaces with firm walls. But it was not until the early part of the Nineteenth Century that the general notion that the whole body of the higher organisms was composed of a mass of cells was gained. This generalization became established by Schleiden and by Schwann in 1838. The importance of the cell-contents was not at first appreciated, but when they were found in constant motion in the live plant-cell (Corti, 1772, and Treviranus, 1807), the idea that they were the essential living substance came to prevail. The name of protoplasm was first assigned to the cell-contents by Mohl (1846). Gradually, as cells without walls were discovered, the idea of cell took on this form—a mass of protoplasm possessing a single nucleus.

The *chemical composition* of protoplasm throws little light on vital action, although vital action is a chemical process. The reason is that the form of the molecules rather than the quantitative analysis or the enumeration of the elements is at the basis of life. Carbon, hydrogen, oxygen, nitrogen, are always present, and sulphur, phosphorus, potassium, and certain other alkalis and metals are usually found in small quantities. The dead protoplasm consists chiefly of albuminous substances, including nuclein, 34 per cent.; lecithin and fats, 14 per cent.; various albuminoids, 14 per cent.; and, for the rest, numerous other substances.

Cell Activity.—Cells, apart from the process of division, show active processes in their protoplasm, especially by their capacity for movement and response to stimulus. Cell-movement takes on diverse forms according to circumstances. In naked, free cells, like the Amœba, the most evident movements are the throwing out of blunt, finger-like processes (pseudopodia). If one of these takes the lead it determines the direction of locomotion of the whole cell, for the rest of the body flows into the pseudopod. Often the pseudopodia are numerous and extremely fine; under these circumstances minute particles may be seen streaming in the current of the protoplasm which moves along the thread. In the case of cells with a firm wall, the protoplasm often streams in fine threads through the fluid-filled cell-space, or in other cases a marvelous rotatory movement is seen. The causes of protoplasmic movement are not altogether clear. Recently, however, attention has been called to the fact that other foamy masses—especially a drop of oil filled with vesicles of water—will send out pseudopodium-like processes. So that the constant movement of the protoplasm may be the physiological concomitant of its unstable structure. Other forms of cell-movement are the lashing of whips (flagella) or little hairs (cilia) covering the free swimming cell (Protozoa and Protophyta).

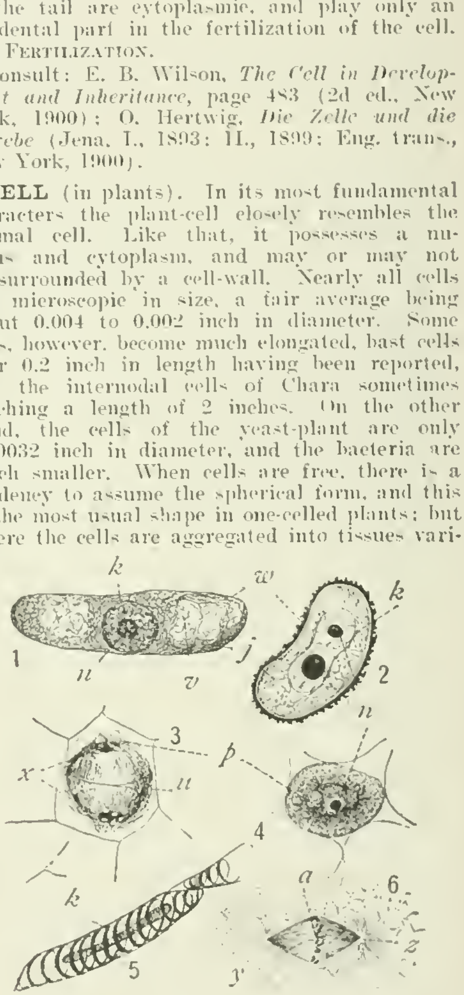
Response to Stimulus.—Irritability is a fundamental property of protoplasm, so we find it present in unicellular organisms and in the tissue cells. Protoplasm is active only within certain limits of temperature, beyond which quiescence — heat rigor or cold rigor — occurs. Protoplasm (of Myxomycetes) will flow with reference to a source of heat — toward that temperature to which it is most 'attuned.' The direction of light-rays may also determine the direction of locomotion. When a ray of white light passes obliquely through an amœba, the latter moves from the source of light. Also, the chlorophyl bodies of a leaf will move away from the surface which is too intensely illuminated. Likewise the electric current, gravity, contact, and chemical agents may awaken definite responses in cell-protoplasm.

The forms assumed by cells are most diverse. In the animal's body they are united to form tissues, and the cells of each kind of tissue have their peculiar form. The cells of the skin are flattened or cuboidal; those lining the food-canal are columnar; muscles are composed of elongated compound cells and nerves give rise to processes that may be two feet or more in length. These kinds of cells will be considered under HISTOLOGY.

The Germ-Cell.—The egg and the spermatozoön, the union of which is the initial act in sexual reproduction, are each single cells, derived, like the other cells of the body, by the division of preëxisting cells. The two kinds of germ-cells are, however, very different in appearance and function. The egg-cell (ovum) is of great size, due to the fact that it is stuffed full of food-material, the so-called yolk. The nucleus is large, and is commonly called the germinative vesicle, and in its open-meshed films the chromatic material is lodged. The entire egg is often enveloped in one or more envelopes for its protection. The spermatozoön is of extremely small size. It is typically a thread-like cell, enlarged at one end to form the head. Behind the head is the middle piece, followed by the lash or tail. The head contains the nucleus, which is here dense, without water, but consisting almost wholly of chromatin. The middle piece seems to contain the centrosome. The outer envelope of head and middle piece and the whole of the tail are cytoplasmic, and play only an incidental part in the fertilization of the cell. See FERTILIZATION.

Consult: E. B. Wilson, *The Cell in Development and Inheritance*, page 483 (2d ed., New York, 1900); O. Hertwig, *Die Zelle und die Gewebe* (Jena, I., 1893; II., 1899; Eng. trans., New York, 1900).

CELL (in plants). In its most fundamental characters the plant-cell closely resembles the animal cell. Like that, it possesses a nucleus and cytoplasm, and may or may not be surrounded by a cell-wall. Nearly all cells are microscopic in size, a fair average being about 0.004 to 0.002 inch in diameter. Some cells, however, become much elongated, bast cells over 0.2 inch in length having been reported, and the internodal cells of Chara sometimes reaching a length of 2 inches. On the other hand, the cells of the yeast-plant are only 0.00032 inch in diameter, and the bacteria are much smaller. When cells are free, there is a tendency to assume the spherical form, and this is the most usual shape in one-celled plants; but where the cells are aggregated into tissues various modifications are met, the cells becoming compressed, elongated, flattened, star-shaped, etc. In all except a few of the lowest plants, the cell has a wall of cellulose, a substance de-



CELL: *1*, a cell showing wall (*w*), cytoplasm (*j*), vacuoles (*v*), nucleus (*k*), and nucleolus (*n*); *2*, cell with heavy wall (*w*), and an elongated nucleus (*k*) with two nucleoli (*n*); *3-5*, with same lettering; *6*, a spindle showing centrospheres (*z*), spindle fibres (*y*), and chromosomes (*a*).

rived from the protoplasm. As growth proceeds, the original wall of cellulose may become modified, the various changes being called lignification, suberization, etc. In spores the outer portion of the wall usually develops spines, furrows, and various sculpturings, that are sufficiently constant to be of value in classification. The internal modifications of the cell wall are no less numerous and striking. Sometimes there is a uniform thickening, but more commonly the thickening is irregular and results in the appearance of striations, spirals, rings, reticulations, and different forms of pits.

Contents. The most important contents of the cell are the nucleus and the cytoplasm, but besides these various other things may be present, such as plastids, starch-grains, crystals, oil-drops, sap, etc. *Plastids* are differentiated portions of the cytoplasm, and it has been believed by many that they are permanent organs of the cell, passed on from one cell generation to another, and it is undoubtedly true that they divide and may persist throughout the greater part of the life history of a plant; but whether they are present in the initial cell of the plant or not is a serious question, and if not, it must be admitted that they may be formed *de novo* from the cytoplasm. Colorless plastids are called 'leucoplasts,' and colored ones 'chromatophores.' If a chromatophore contains chlorophyll (the green pigment) it is called a 'chloroplast,' but if it contains any other coloring matter it is a 'chromoplast.' The function of the leucoplast is to produce starch, but if light conditions are favorable the leucoplast may be converted into a chloroplast. Chloroplasts vary greatly in form, in size, and in the number found in a single cell. In the higher plants they are small flattened or discoid bodies, and many are usually found in a single cell. However, in Anthoceros (a liverwort) and Selaginella (little club-mosses), there is only one in a cell. The greatest variety of forms is found among the seaweeds (Algæ), where there are not only the small discoid forms, but also flattened plates, coiled bands, etc. The chloroplasts, like the leucoplasts, produce starch, but they are also able to manufacture carbohydrates in the presence of light (photosynthesis, q.v.). *Starch-grains* vary in form and size. While the size may vary greatly with age, the form is usually characteristic of a given plant. The starch formed by the chloroplasts is in the form of very small granules, which do not become large grains, but disappear when light is removed, and are probably carried to other portions of the plant. The ordinary starch-grains are developed in the protoplasm. *Crystals* composed of calcium oxalate are widely distributed. In form they are prismatic, cubical, octohedral, acicular, etc. Those which are needlelike in form are called 'raphides.' Cystoliths composed of calcium carbonate are much less common.

Cytoplasm and Nucleus. These are the living portions of the cell. So far as known, there is no difference in the structure of the cytoplasm of animal and plant cells. The nutritive portion of the cytoplasm has been termed the 'trophoplasm,' and the thread-like portions which are particularly concerned in cell-division and other phenomena of motion are called 'kinoplasm.' The bounding ('limiting') layer of the cytoplasm is called the 'Hautschicht.' While cells are young, the cytoplasm fills the entire space between the nucleus and the cell-wall, but as the cells increase in size vacuoles (apparently empty spaces) appear, and the cytoplasm merely forms a wall layer connected with the nucleus by constantly shifting strands.

Nucleus. The nucleus is an exceedingly complex structure. An undoubted nucleus has been demonstrated in all groups of plants except in blue-green Algæ (Cyanophyceæ) and Bacteria. From the seed-plants down to the Algæ a single nucleus in a cell is the rule, but there are many exceptions. The absolute size of nuclei is exceedingly variable. As a rule, it may be said that large cells have large nuclei. The nuclei of reproductive cells are generally larger than those of the vegetative cells of the same plant. The nuclei of the lilies, orchids, and conifers are usually large, while those of mosses and dicotyledons are small. For example, the nucleus of the egg of the common Austrian pine (*Pinus laricio*) can be seen with the naked eye, being 0.006 inch in diameter; while the nuclei of some of the fungi are scarcely 0.00008 inch in diameter. The nuclei of the lilies, which are seldom more than 0.002 inch in diameter, may be regarded as unusually large, and they have been studied more than any other plant nuclei.

Form of Nucleus. The nucleus in young cells is usually spherical, but as cells grow older its form may change in innumerable ways. When cells become elongated, as in the development of vascular tissue, the nuclei may also elongate, the length becoming a hundred times as great as the breadth. In the mucilaginous sap of some amaryllises nuclei have been observed in which the length had become more than five thousand times as great as the breadth. In the endosperm of Indian corn the nuclei acquire remarkable reticular forms, while in some of the stonecrops (*Sedum*) they become variously lobed. In some pollen-grains one of the nuclei becomes so amœboid in form that it is easy to believe that it may be capable of ameboid movements; and in one of the slime-molds such movements have actually been observed.

Division of Nucleus. It is accepted that a nucleus never arises *de novo*, but only by the division of a preëxisting nucleus. The principal structures concerned in division are the chromosomes, the linin, the spindle (achromatic figure), and the centrosome. The last structure, however, is not so constantly present as in animals, and many believe that it does not exist at all in the fern-plants (pteridophytes) and seed-plants (spermatophytes). In the cells which produce pollen-grains the spindle first appears as a weft of fibres surrounding the nucleus, which become grouped into cones forming a multipolar spindle, that gradually becomes bipolar. In ordinary vegetative cells the spindle is bipolar from the start, making its appearance as a pair of dome-shaped caps at opposite poles of the nucleus. The chromatin is generally regarded as the most important part of the nucleus, as it is believed to be the morphological basis of heredity. During division the chromatin assumes the form of a narrow band which divides into a definite number of more or less elongated pieces, the chromosomes. The number of chromosomes is constant in a given species, and the number in the sexless generation (sporophyte) is always double the number found in the sexual generation (gametophyte). The reduction in number takes place during the formation of spores. When the nucleus of the sperm fuses with that of the egg, the double number is restored. The splitting of the chromosomes in the vegetative divisions, and perhaps also in the divisions concerned in the reduction of chromosomes, is longitudinal. Some of the fibres of the spindle become attached to the chromosomes, half the number being drawn to one pole and half to the other, while a series of granules, the beginning of a new cell-wall, appears on the fibres which stretch between the young nuclei. The wall becomes completed as the fibres disappear. In the formation of the endosperm of seeds, and in some other cases, nuclear division may take place without being followed by the formation of a cell-wall—a phenomenon called free nuclear division. See FERTILIZATION; CYTOLOGY.

CEL′LA (Lat. *cell*). The name applied to the central chamber or *naos* of a Greek or Greco-Roman temple; sometimes limited to the most sacred inclosure, containing the chief object of veneration, and sometimes extended to include the ante-chamber or *pronaos* and the storehouse for native offerings in the rear. See TEMPLE.

CELLAMARE, thā′lyȧ-mä′rȧ, ANTONIO DEL GIUDICE, Prince of (1657-1733). A Spanish diplomat, born in Naples. He was trained at the Spanish Court, and during the War of the Spanish Succession was an active partisan of Philip V. In 1715 he was appointed Ambassador to France, where he was the leading figure in the conspiracy to effect the overthrow of the Duke of Orleans and obtain the French regency for Philip V. Consult Martens, *Causes célèbres du droit des gens* (2d ed. Leipzig, 1861).

CEL′LARER (Fr. *cellérier*, Lat. *cellerarius*, from *cellarium*, cellar, from *cella*, cell). A person under the Roman emperors who supervised the domestic affairs of the household and examined accounts. The same title was given in later times to the purveyors for monasteries or priests. As an officer of a monastery the cellarer regulated every matter affecting provisions.

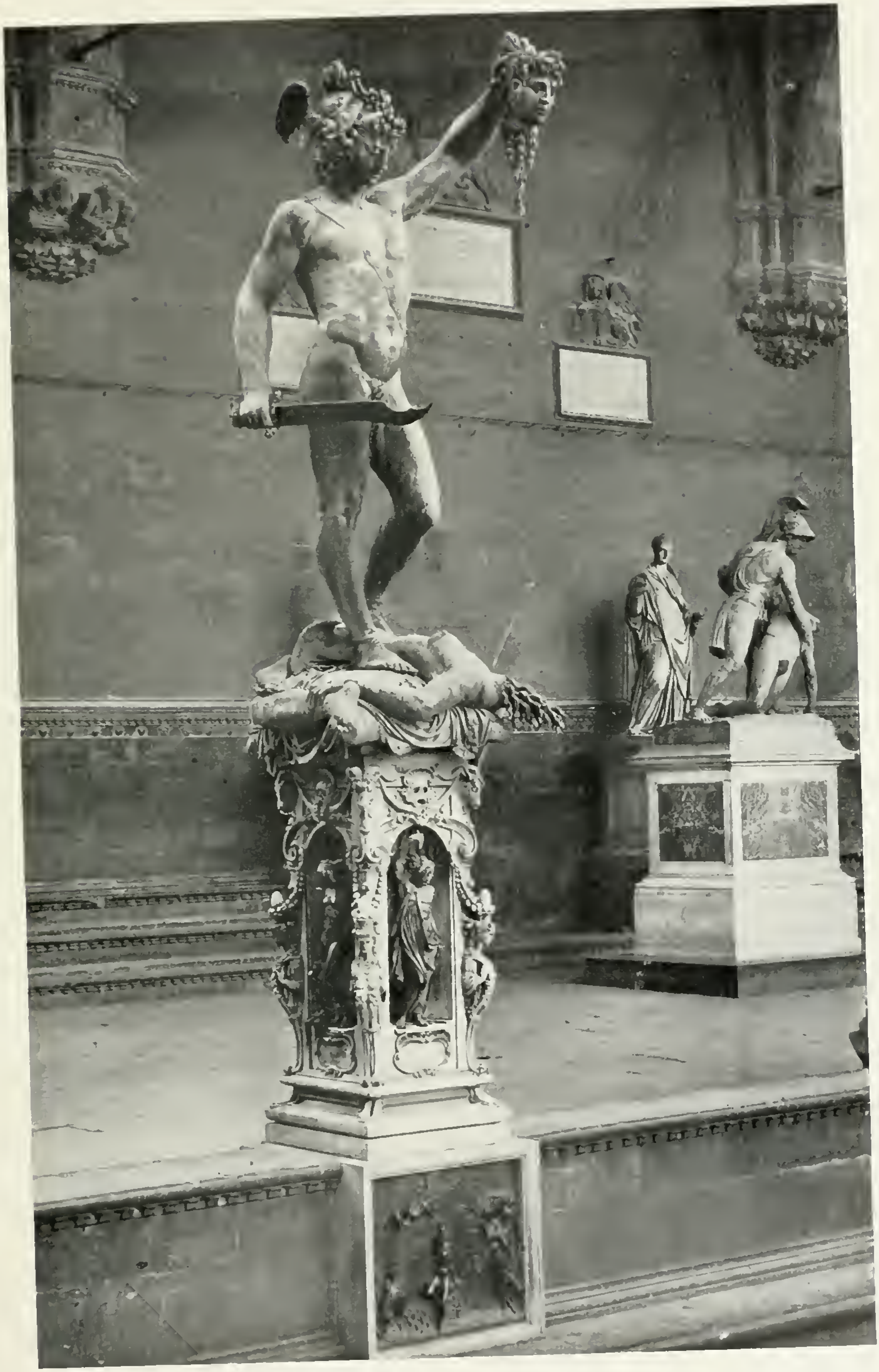
CELLA′RIUS, KELLER CHRISTOPH (1638-1707). A German scholar, born in Schmalkalden (Hesse-Nassau). He was educated at the universities of Jena and Giessen, and after holding posts as instructor or rector in various gymnasia, was appointed professor of history and eloquence at Halle in 1693. By his manuals he promoted the knowledge of geography and history, and by his editions of Latin authors greatly encouraged classical studies in Germany. Among his publications are *Orthographia Latina* (new ed. by Harles, 2 vols., 1768) and *Notitia Orbis Antiqui* (new ed. by Schwarz, 2 vols., 1773). Consult Hail, *Oratio de Vita et Studiis* (Halle, 1875).

CELLE, tsĕl′lĕ. A town in the Prussian Province of Hanover, situated on the left bank of the navigable Aller, 23 miles northeast of Hanover (Map: Prussia, D 2). It consists of the old town and of a number of suburbs annexed to it during the second half of the Nineteenth Century. Among the notable buildings are the castle, formerly (1369-1705) the residence of the Dukes of Celle; a number of old churches with monuments of royal personages; and the Rathaus, dating from the Sixteenth Century. The chief products of the town are woolen yarn, printer's ink, soap, tobacco, etc. It has a considerable trade in lumber and salt. Celle is the seat of the supreme court of the province, and has a library of 60,000 volumes, including a number of manuscripts. Population, in 1890, 18,901; in 1900, 19,872.

CEL′LIER, ALFRED (1844-91). An English musician, born at Hackney. He was appointed organist of All Saints', Blackheath, in 1862, and of Saint Alban's, London, in 1868. From 1877 to 1879 he was the conductor of the Opera Comique, London. His works include some popular songs and part-songs, compositions for pianoforte and orchestra, and several operettas and operas, including *The Tower of London* (1875); *The Sultan of Mocha* (1876); *The Spectre Knight* (1876); *In the Sulks* (1880); and *The Mountebanks* (with book by W. S. Gilbert; presented in 1892). He also set to music (1881) Longfellow's *Masque of Pandora* and (1883) Gray's *Elegy*.

CELLINI, chĕl-lē′nē, BENVENUTO (1500-71). An Italian sculptor and goldsmith. He was born in Florence. In compliance with the wishes of his father, Cellini devoted himself to music until his fifteenth year, but his desire to learn designing prevailed, and he became a pupil of the sculptor Marconi. As the result of a duel in which he was concerned he was forced to leave Florence, and after wandering from town to town finally went to Rome. Here he attracted the attention of Pope Clement VII. by his beautiful designs. Cellini became the greatest worker in precious metals of his time. From his autobiography we learn that he was also initiated in "the mysteries of the brass-foundry, the methods of hammering iron, the secrets of chiseling steel for medals, and casting dies. . . . Enameling and niello formed special branches of his craft; nor could architecture be neglected." He was employed to fashion silver vases, to design medals and settings for jewels, to enamel bookbindings, cast portraits in bronze, and decorate sword-blades—in fact, to exercise his perfect art on court trappings, palace decorations, and the personal adornment of those who figured in the splendid society that existed in the days of the French and Italian Renaissance. Cellini was in Rome when it was besieged by the Constable de Bourbon, and, according to his own account, it was he who killed both the Constable and the Prince of Orange. Several not very honorable adventures necessitated frequent changes of scene at this period of Cellini's life. He went to Florence and Mantua and then returned to Rome, where he worked under Michelangelo. At Rome he was employed by many distinguished patrons of art, but afterwards was allowed to return to Florence, whence he had previously fled on account of an 'affray.' Compelled to leave Florence a second time by reason of another 'affray,' he went back to Rome again. There his life was given up as usual to brawling, dueling and art-work, as he himself narrates. Francis I. invited him subsequently to his Court, and Cellini stayed in France five years, the recipient of a pension and title from the King. There he modeled the bronze relief of the "Nymph of Fontainebleau" (now in the Louvre), a fine specimen of his work.

Upon his return from France, where he had alienated himself from every one at the Court by his quarrels and eccentricities, Cellini went to Florence, and found a friend there in Cosimo



BENVENUTO CELLINI

"PERSEUS"

FROM THE SCULPTURE IN THE LOGGIA DEI LANZI, FLORENCE

de' Medici. During this period he produced the bronze statue of Perseus with the head of Medusa (Loggia dei Lanzi, Florence). This statue, which is colossal, proves that Cellini was essentially a worker in the small. Although the figures are a marvel of technical excellence and the work is beautiful in conception, the statue is lacking in simplicity of modeling and breadth of treatment and is overwrought in detail. In the Vienna Art Museum is a salt-cellar of wonderful workmanship, regarded as his masterpiece in goldsmith's work. It is of embossed gold and enamel, ornamented with figures of Neptune and Cybele in high relief. It was in such examples of decorative work that Cellini excelled. That which required the skill of a perfect craftsman appealed most readily to his imagination. Though always an admirer of Michelangelo, he had not, like that master, an intellectual ideal, and never seemed to look beyond the production of mere beauty in his figure work. In his fifty-eighth year he began to write his autobiography, and during this time he shaved his unsanctimonious head and retired to a monastery. But two years afterwards he returned to the reckless, dissolute life he had led in his youth. He died in Florence, February 25, 1571, and was buried in the Church of Santa Annunziata. It is not the existing examples of Cellini's art alone that make his name memorable. His place is made definite by his remarkable personality as betrayed in his autobiography, which has been translated by Goethe and others. He lived in a time when the passions of men were uncontrolled, and Cellini himself embodied them all. His acts of hatred, theft, murder, and sensuality are all set forth in writing, and he also portrays in strong phraseology the scenes, political, social, and ecclesiastical, that made up the history of his contemporaries. His words give vivid pictures of that period of the Renaissance as well as of his own turbulent, brilliant career. The best Italian edition of his works is by Guasti (Florence, 1891); English translation, *The Life of Benvenuto Cellini*, by Symonds (New York, 1888). Consult also the fine biography by Plon, *Benvenuto Cellini, orfèvre, médailleur, sculpteur* (Paris, 1882, supplement, 1884).

CELL OF PEAUCELLIER, pō's'-lyā'. See Linkages.

CELLULAR TISSUE. See Connective Tissue; Histology.

CEL'LULI'TIS (Neo-Lat., from Lat. *cellula*, dim. of *cella*, cell), or Ethmyphitis (Neo-Lat., from Gk. ἠθμός, *ēthmos*, colander + ὑφή, *hyphē*, web). A diseased condition of the subcutaneous areolar tissue and connective tissue, presenting œdema, swelling, hardness, bogginess, fluctuation, suppuration, and sometimes sloughing. It is usually preceded by a wound, such as the bite of an animal, or an infected lesion of some sort. A dissection wound is a common type. The pain is severe, and there are generally somewhat grave constitutional symptoms, as fever, severe headache, nausea, prostration, loss of appetite, and general weakness. Salines, iron, and sometimes stimulants are useful, with incisions to relieve tension or to let out the products of suppuration. See Phlegmasia.

CELLULOID (Lat. *cellula*, little cell, dim. of *cella*, cell). A substance of modern invention widely used in the arts as a substitute for ivory, india-rubber, and leather, and for many other purposes. Celluloid was first made in England by a Mr. Parkes, of Birmingham, in 1856, and was given at first the name *parkesine*. Its manufacture was developed in America by John W. Hyatt, of Newark, N. J., in 1869, who is said to have made the invention independently. Celluloid is obtained by mixing gum camphor with pyroxlin (guncotton pulp) in the proportion of about two parts of pyroxylin to one of camphor. The usual process is to dissolve the camphor in the least possible quantity of alcohol and sprinkle it over successive layers of the dry pyroxylin, until the desired thickness is reached. The mass, thus treated, sinks into transparent lumps and in this form is worked for an hour between cold rollers, and then between rollers which are slightly heated. The mass is next subjected to hydraulic pressure for twenty-four hours in a room kept at a temperature of 70° F. It is then cut into sheets of the desired thickness and allowed to dry for fourteen days, when it is ready to be manufactured into articles. It is also manufactured in the form of a liquid coating to be applied to other materials, such as cotton, linen, or paper, or for use in other ways. Any color can be given to celluloid by the use of coloring matter during the process of manufacture. Some of the advantages of celluloid, besides its cheapness and durability, are that it takes a high polish, does not warp or discolor, and is impervious to moisture. As ordinarily manufactured, it is highly inflammable.

CELLULOSE (from Lat. *cellula*, dim. of *cella*, cell). The chief constitutent of the cell-walls of all vegetable cells. These walls constitute the plant-skeleton and also form a protective covering for the sensitive, living protoplasm. In certain plants the reserve food is stored up in the form of cellulose. The relative chemical composition of cellulose is shown by the formula, $C_6H_{10}O_5$; its molecular structure is, however, exceedingly complex, probably much more so than that of starch, to which it is chemically allied. True cellulose is not found in animal tissues, though considerable amounts of it are digested and absorbed by man and especially by the herbivora; its digestion is probably effected by a specific enzyme, of the action of which, however, nothing is at present positively known. The chief value of its digestion by the animal organism has been assumed to consist in this, that when it is dissolved, the true foodstuff of the cells is liberated and becomes available. Cellulose is manufactured on a large scale from wood, cotton, linen rags, hemp, flax, and similar materials of vegetable origin. Being insoluble in all ordinary solvents, it may be readily separated from the other constituents, which are soluble in water, alcohol, ether, dilute alkali, or dilute acids. It is often further purified by treatment with a cold mixture of nitric acid and potassium chlorate (Schulze's reagent). The stability of cellulose is so great that considerable quantities of it are preserved unaltered through the process of formation of coal, in which its presence may be demonstrated by means of suitable reagents. It is soluble in an ammoniacal solution of cupric oxide, from which it separates out in a pure state on addition of acid; the precipitate is washed with alcohol, and the cellulose is thus obtained in the form of a white amorphous powder.

The action of sulphuric acid on cellulose depends largely on the concentration of the acid. Moderately dilute sulphuric acid transforms it, in the cold, into 'colloidal cellulose,' which is soluble in water, but is reprecipitated on addition of a trace of acid or of salt solution. If cellulose is dissolved in strong sulphuric acid and the solution is diluted with water, a gelatinous mass separates out, which is known as *amyloid*. In the presence of acid, amyloid is, like starch, colored blue by a solution of iodine. This transformation may be employed for detecting the presence of cellulose. Vegetable parchment, too, is made from cellulose by the use of sulphuric acid; for this purpose unsized paper is immersed for a few instants into concentrated sulphuric acid and then immediately washed with water, the paper thus becoming more durable and less permeable to liquids. Another transformation of cellulose, effected by sulphuric acid, may be mentioned here: if cellulose derived from cotton is digested for some time with strong sulphuric acid, then diluted with water and subjected to prolonged boiling, the cellulose is partly converted into grape-sugar.

With strong nitric acid cellulose forms explosive nitrates known as nitro-celluloses, the composition of which depends on the strength of the acid employed and the duration of the reaction. *Collodion* is a solution mainly of the tetra-nitrate and the penta-nitrate of cellulose in a mixture of alcohol and ether. *Guncotton* is the hexa-nitrate of cellulose, obtained by the prolonged action of a mixture of concentrated nitric and sulphuric acids.

If distilled in retorts, out of contact with air, cellulose is decomposed with formation of methyl alcohol, formic acid, acetic acid, and various hydrocarbons. All of these products are formed also in the destructive distillation of wood.

Cellulose is employed, in one or the other form, for a variety of purposes in the arts. It is largely used in the manufacture of paper and of explosives. By dissolving the nitrocelluloses of collodion in melted camphor the substance known as celluloid is obtained, and celluloid is now extensively employed for making various articles in common use. Practical use is now also made of the swelling capacity of cellulose. The fact that the substance, when wet, will rapidly fill up a hole that has been made through it, has suggested the idea of employing it to prevent leakage through shot-holes. Within recent years the usefulness of cellulose for this purpose has been repeatedly demonstrated, and at present the substance is actually employed as a packing for the sides of war-vessels. See CELL; CARBOHYDRATES.

CELMAN, sāl′män, MIGUEL JUAREZ. See JUAREZ CELMAN, MIGUEL.

CELSIUS, sĕl′sĭ-ŭs *or* sĕl′shĭ-ŭs, ANDERS (1701-44). A Swedish astronomer, born in Upsala. In 1730 he became professor of astronomy in Upsala University. He undertook a journey to prominent observatories of Europe in 1732, and in 1740 built the observatory at Upsala, and was appointed its director. In 1737 he took part in the French expedition sent to measure one degree of meridian in the polar regions. He was one of the first to call attention to the subsidence of the sea-level off the northern coast of Sweden, and urged the introduction of the Gregorian calendar, to supersede the Julian. In his monograph *On the Measurement of Heat* (1742), he presented the first idea of the centigrade, also known as the Celsius, thermometer. He published, among other scientific treatises, *De Observationibus pro Figura Telluris Determinanda in Gallia Habitis.*

CELSIUS, OLOF VON (1716-94). A Swedish historian. He was born in Upsala, where he became professor of history in 1747. He was appointed Bishop of Lund in 1777. In 1742 he founded the first literary journal in Sweden. His works on Gustavus I. and Eric XIV. are characterized by careful investigation and strict truthfulness. He died while engaged upon his celebrated work, *Svea rikes kyrkohistoria*, which is the first attempt at a compilation of Swedish Church history.

CEL′SUS (Gk. Κέλσος, *Kelsos*). A Greek philosopher of the Second Century, the earliest literary opponent of Christianity. He wrote, in 177 or 178, an attack on Christianity, called *Λόγος Ἀληθής*, or *A True Discourse*. This work has been lost, but by means of Origen's reply, the *Contra Celsum*, it has been ingeniously reconstructed by Keim (*Celsus' wahres Wort wiederhergestellt*, 1873). See ORIGEN.

CELSUS. One of the adventurers, fancifully styled by Trebellius Pollio the 'Thirty Tyrants,' who, between A.D. 260 and 267, rose to usurp the imperial throne of Rome. A military tribune, resident in Africa, he was proclaimed Emperor by Vibius Passienus, proconsul of the province, and others; but on the seventh day of his ill-starred reign he was murdered in Sicca.

CELSUS, AULUS CORNELIUS. A Latin physician and writer, who flourished probably in the reign of Tiberius. He was called the Roman Hippocrates, because he generally followed the great 'father of medicine,' and introduced the Hippocratic system among the Romans. Celsus wrote not only on medicine, but also on rhetoric, history, philosophy, the art of war, and agriculture. His style is succinct and clear, but full of Græcisms. Only part of his encyclopædic work survives, the *De Medicina*, which is divided into eight books. The portions relating to surgery are exceedingly interesting and valuable, because Celsus has there given an account of the opinions and observations of the Alexandrian school of medicine. The first edition of the *De Medicina* appeared in Florence in 1478. The standard edition is that of Daremberg (Leipzig, 1859). The *De Medicina* has been translated into English by J. Grieve (3d ed., Edinburgh, 1837).

CELT. An implement used among the primitive peoples of every part of the world. The term is from the Welsh *cellt*, which signifies a flint, or flintstone—a typical form of the implement. In developed form it is a chisel or grooveless axe of any hard stone, used either with or without a haft, in the former case hafted either in line with or transverse to its length and edge. In its nascent form it is an elongated pebble or other stone of convenient size, used in the hand with centripetal (i.e. inward and downward) strokes. Next to the hammerstone it is the most primitive implement used by man (if not by the quadrumana); indeed, the hammer and celt, with the muller, pestle, and haftless axe a little higher in the scale, are all differentiated from the original protolith, or designless pebble, and are closely akin in both form and function. At first shaped only by wear, the celt is in higher culture fashioned by battering and grinding, then by chipping, and finally by combinations of chipping, battering, and grinding best adapted to particular materials. Better than any other single implement, the celt illustrates the transition from protolithic culture to technolithic culture in early human development. For illustration, see ARCHÆOLOGY, AMERICAN.

CEL'TIBE'RI (Lat. nom. pl., from *Celtus*, Celt + *Iberus*, Iberian, Gk. Κελτίβερες, *Keltiberes*). A powerful people of ancient Spain, supposed to have sprung from a blending of the Iberians or Spanish aborigines with Celtic invaders from Gaul. The Celtiberi inhabited a large inland district of the peninsula, corresponding to the southwest half of Aragon and the northern and eastern parts of Castile, but the name Celtiberia had often a wider signification, including the country as far south as the sources of the Guadalquivir. The Celtiberi were divided into four tribes, and were unquestionably one of the bravest and noblest peoples in the peninsula. Their cavalry and infantry were equally excellent. The Romans met their powerful resistance after the Second Punic War, and they were finally conquered by the destruction of Numantia, one of their chief towns, by Scipio Africanus in B.C. 133. They later joined the revolt of Sertorius, but after his death in B.C. 72, they became quite Romanized in customs, language, and dress.

CELTIC or **KELTIC CHURCH** (Lat. *Celticus*, from *Celtæ*, Gk. Κέλται, *Keltai*, or Κελτοί, *Keltoi*; originally meaning high, and probably connected with Lith. *kéltas*, high, *kálnas*, hill, Lat. *celsus*, high, Gk. *κολωνός*, *kolōnos*, hill, less plausibly connected with OIr. *Goidel*, Gael. *Gaidheal*, *Gael*, Gael). The earliest Christian Church in Great Britain and Ireland. It is not definitely known when Christianity was there introduced. Roman tradition puts it in the Second Century as the result of a request from King Lucius of Eleutherius, Bishop of Rome from 177 to 193; others argue for the same period, only they connect it with the fierce persecution at Lyons, which drove Christians across the English Channel. These fugitives carried with them the Eastern form of Christianity which the Lyons Church had. In the Third Century Christianity existed in Britain; and in the Fourth, bishops from that country sign conciliar rolls. In the Fifth Century the British province of Britain was essentially Christian. In the Sixth Century the invading Saxons drove the Celts into the mountains of Wales and there four bishoprics existed. Augustine was sent to England by Gregory I. in 596, and so the Roman form of Christianity, which in some details differed from the Celtic form, especially as to the date of observing Easter, which the Celts in common with the Eastern Church observed on the 14th of Nisan, on whatever day of the week it came, first found lodgment on British soil. In 603 a conference was held by Augustine with some Celtic bishops, but his haughty bearing alienated them. Gradually, however, the Roman form encroached upon the Celtic, and in 777 the last station in South Wales had conformed to Rome. Still the Celtic Church was not extinct farther north, but it was declining; and in 1172 it was reformed upon the model of Rome.

Christianity was introduced into Ireland by Saint Patrick, sent by Pope Celestine about 475. Nearly the whole island was converted before his death. As he was the grandson of Christians who dwelt on the Clyde, Christianity must have penetrated into Scotland in the Fourth Century, or even earlier. But it was strengthened by Irish monks, who, coming with Saint Columba about 563, carried on missionary operations from Iona as a centre, and especially in Northumbria. In 664 the Celtic Church in Northumbria conformed to the Roman model, and so its separate history ended, as was the case in Scotland in 1153. In Ireland, the merging of the Celtic into the Roman rite was completed in the same year, and henceforth England, Scotland, and Ireland were Christian without variant rites and ceremonies. See CULDEES.

CELTIC LANGUAGES. A group of languages, both ancient and modern, belonging to the Indo-European family, and now comprising Welsh, Breton (Armoric), Irish, Scottish Gaelic, and Manx. The connection of the Celtic languages with the Indo-European family has been recognized since the time of Pictet (1837) and Bopp (1838), but the scientific study of them dates from Johann Caspar Zeuss, whose *Grammatica Celtica* (1853) laid the foundations of modern Celtic philology. His work has been continued by a series of distinguished scholars both in the British Isles and on the Continent, and rapid progress has been made in all departments of the subject. But Celtic studies are still new, and it will be long before the Celtic languages are as well understood or the literatures as fully analyzed as those of the Germanic and Romance peoples. Within the Indo-European family the Celtic group stands linguistically, as it does geographically, in closest relation with the Italic and Germanic. Certain common characteristics of the Celtic and Italic (e.g. the formation of the passive in *-r*) have led to the assumption of a common Italo-Celtic language. But it is safer to account for them by a theory of interaction and mutual influence. The Celtic languages themselves fall into two main divisions—the Continental and the Insular. Of the Continental Celtic, or Gaulish, very little is known. The Gaulish languages died out early, and no literary monuments of them have been preserved. The only remains are inscriptions and coins, which yield little besides proper names. More material of the same sort is found in the Greek and Latin historians. The Insular Celtic consists of two groups of languages—the British, or Brythonic (comprising Welsh, Breton, and Cornish), and the Gaelic, or Goidelic (comprising Irish, Scottish Gaelic, and Manx). Pictish has sometimes been reckoned with the Celtic languages, but present opinion inclines to regard it as not Indo-European. Of the six insular Celtic languages, five are still living. Cornish died out toward the end of the Eighteenth Century. Welsh and Breton are each spoken to-day by more than a million of people; Irish by more than a half a million; and Scottish Gaelic by rather fewer. These languages, however, do not constitute the sole vernacular of the people, most of whom speak also either English or French, according to their nationality. Manx seems likely to die out in the near future, unless it is rescued by the earnest agitation now going on in all the Celtic countries for the presrvation of their national tongues. See Neo-Celtic Movement.

Bibliography. Lhuyd, *Archæologia Britannica* (Oxford, 1703), is still useful. The *Grammatica Celtica* appeared in a second edition, much improved by the work of Ebel (Berlin, 1871). Important general articles on the Celtic languages were contributed by Windisch to Ersch and Gruber's *Encyklopadie*, part ii., section xxxv. (Leipzig, 1884), and to Gröber's *Grundriss der romanischen Philologie* (Strassburg, 1888, et seq.). Consult, also, Brugmann, *Vergleichende Grammatik der indogermanischen Sprachen* (2d ed., Strassburg, 1897). Important articles on all the Celtic languages are to be found in the *Revue celtique* (Paris, 1870, et seq.); the *Zeitschrift für vergleichende Sprachforschung* (Berlin, 1852-96); and the *Zeitschrift für celtische Philologie* (Halle, 1891, et seq.). References to other scattered articles are given in those periodicals. For Gaulish, consult Holder, *Altceltischer Sprachschatz* (Leipzig, 1891); for Irish Windisch, *Kurzgefasste irische Grammatik* (Leipzig, 1879), a second edition of which is being brought up to date. For modern Irish, recent grammars show very little advance over O'Donovan, *Grammar of the Irish Language* (Dublin, 1845). A new grammar by the Christian Brothers, Dublin, is just announced (1902). For Scottish Gaelic: Gillies, *The Elements of Gaelic Grammar* (London, 1896), based on the elder work of the Rev. Alexander Stewart. Manx: Kelly, *A Practical Grammar of Manx*, Manx Society (Douglas, 1859; London, 1870); Rhys, *The Outlines of the Phonology of Manx Gaelic* (Douglas, 1894). Welsh: Rowland, *A Grammar of the Welsh Language* (4th ed., Wrexham, 1876); Anwyl, *Welsh Accidence* and *Welsh Syntax* (London, 1897-1900), which are more scientific. Breton: There are several old grammars by Rostrenen (Rennes, 1738); Le Gonidec (Paris, 1807); Guillôme (Vannes, 1836); and Hingant (Tréguier, 1868). Ernault has recently published a *Petite grammaire bretonne* (Saint-Brieuc, 1897). See Gaelic; Irish; Manx; Welsh.

CELTIC LITERATURE. See Breton Literature; Celtic Language; Cornish Language and Literature; Irish (Gaelic) Literature; Manx Literature; Scottish (Gaelic) Literature; Welsh Language and Literature.

CELTIC MUSIC. Welsh and Irish music are inseparably connected, for although each country developed its music in accordance with its own traditions and local forms, the bard was the dominant influence which shaped its general character alike in both Wales and Ireland. Poetry was universally identified with music, and musical instruments were used independently only to furnish dance or march music. In the course of time these conditions were changed, but it was not until the decline of the bards that instrumental soloists became a factor in the development of Celtic music. From the earliest historical times, when in the Eleventh Century a Welsh chieftain summoned Welsh and Irish bards to a great music conference, down to the Seventeenth Century, when distinctive Celtic music ceased to be written, the musical histories of Ireland and of Wales follow much the same general plan; and, to a certain extent, early Scotch music (q.v.) may be associated with them.

Welsh music was founded by, and for centuries identified with, Druidism. Its influence is apparent even in the modified form of those old songs which still exist. The cadences are savage, weird, yet sad, and far superior artistically to their Irish parallels. The direct reason for this superiority is the fact that the Welsh harp had a perfect diatonic scale, while in Ireland the early scale had but five tones. This diatonic scale made possible the full cadences and great range of melody which is noteworthy in the early pastoral music of Wales, and which distinguished it from both the Scotch, with its abrupt changes from major to minor, and the less complete Irish. Traditionally Celtic musical instruments were introduced into Britain by the Phœnicians, but there is no historic basis for such a belief. The principal Welsh musical instruments were the *telyn*, or harp; the *crwth*, or sort of a violin; the *pibgorn*, or hornpipe; the *pib-braich*, or bagpipe; the *tadwrdd*, a drum; and the *cornbuclin*, or bugle-horn.

Irish Music.—The exact number and position of the tones in the original Irish scale have been long a subject of discussion. All that we can be sure of is that at first only five notes were used, and that later a sixth and a seventh were added. The melodies were very similar to the Scotch, with the important exception that the Irish avoided the abrupt and violent modulations so much used by the former. Dance-music, of which there is a great variety, was mostly written in six-eight time. The Seventeenth Century marked the appearance of foreign musicians in Ireland and the rapid decline and final disappearance of a national music. The early Irish musical instruments were the harp; the bagpipe, distinguished from the Scotch pipe by being blown upon by bellows, instead of from the lips; the *ben-baubhill*, a horn of a wild ox or buffalo; the *buinne*, a metal trumpet; the *corn*, a long, curved tube; the *stoc* and the *sturgan*, small trumpets; the musical branch, an instrument adorned with single bells; and the *tympan*, a stringed instrument played with a bow. Of these, by far the most important was the harp, with its large number of strings and its scale of fixed semi-tones. In the latest period of Irish music (toward the end of the Eighteenth Century), there was great uniformity in the compass, the scale, and the method of playing the harp. The ordinary compass was from C below the bass staff to D above the treble staff; and the scale was generally that of G, though sometimes C was used. Almost certainly, however, this uniformity was of comparatively recent date. Some of the oldest harps are the so-called harp of Brian Boru, preserved at Trinity College, Dublin, and having 30 strings; that of Robin Adair at Hollybrooke, with 37 strings; and the Dall way harp, dating from 1621, and having 52 strings. Among the many famous harpists were: Turlogh O'Carolan; Carroll O'Daly, the author of "Eileen Aroon," appropriated by the Scotch as "Robin Adair;" Myles Reilly; and Thomas and William Conallon. Consult: Grove, *Dictionary of Music and Musicians* (London, 1880); collections of Irish music by Bunting (1796, 1809, 1840), and by Petrie, in connection with the Society for the Preservation of Irish Music (1855); also collections of Welsh melodies by Parry and by J. Thompson.

CELTIC PEOPLES. A general designation applied to an ensemble of ethnic groups constituting the predominant element in central and western Europe before the rise of the Roman power and the influx of the German tribes, and speaking a language known to us as Celtic. See CELTIC LANGUAGES.

By various early writers the users of Celtic dialects or languages were treated as a distinct ethnic stock or race, known as the Celts or Kelts; but this view is now generally abandoned. Thus, Keane (1899) observes that the languages are spoken by peoples of so many types that the word Celt "has long ceased to have any ethnical significance;" Ripley (1899) says of the term that "a very grave objection to its use pertains;" and Deniker (1900) declares "there is no 'Celtic' type or race."

The Celtic-speaking peoples occupied in antiquity a very wide territory. Radiating from central Europe, which is their earliest ascertainable seat, they spread far into the west, the south, and even the southeast. The date of their settlement in Gaul is doubtful, being variously estimated from B.C. 1200 to 700. They invaded Italy in the Fourth Century B.C., and in the Third Century made their way into Greece and as far as Asia Minor. It is inferred from a statement of Saint Jerome that a Celtic language continued to be spoken in Galatia until the Fourth Century of our era. The height of the power of the Celtic peoples was probably about B.C. 400. Before that time they had begun to feel the pressure of the Germanic tribes to the north and east of them, and in the centuries that followed the Roman Empire succeeded in subjugating a large part of the Celtic territory. In the British Isles they continued for centuries to maintain their independence.

Beyond these few general facts, our knowledge of the history of the Celtic-speaking peoples is obscure, as is indicated by the diverse views concerning their relations to other Eurasian groups. Their mythology embraced earth gods and various sylvan genii, together with sun or fire deities, and was peculiarly rich in elfin demons and tutelaries, which still pervade the lore of peoples of Celtic ancestry. There were traces also of zoic tutelaries, or beast gods, though this phase of mythologic development appears to have been practically past before the records began; and, as among other branches of the Aryan stock, tradition ran back into the haze of half-deified culture heroes. The social mechanism was dominated by fiducial or ecclesiastical factors, as illustrated by the hierarchic power of the Druids (q.v.), an order of priests or shamans who performed sylvan rites and practiced magical ceremonies surviving long in the form of ordeal and augury, exorcism and obsession; and the clan system was so deep-rooted as still to survive with vestiges of maternal organization clearly traceable, not only in the avuncular descent of authority in the Highland clans, but in the witchcraft so vividly depicted by Shakespeare. The germ of literature appeared in the Oghams and Oghamic inscriptions of Ireland—i.e. in semi-arbitrary characters incised in stone or wood or used in other ways in simple records of men and events. According to Logan (*The Scottish Gael*, 1855) and others, there was a definite Gaelic alphabet of eighteen letters, each symbolizing a tree or shrub, and in still earlier times there was a widespread symbolic system embracing the cross, the fylfot or swastika, the trefoil or trivet, and other figures; while in some degree the symbolism ran into colors and weaves, as illustrated by the Highland tartans. In most of the Celtic groups the musical and poetic elements essential to literary and dramatic development were fostered by classes of popular entertainers—bards, pipers, minstrels—who chanted tribal traditions or played and sang patriotic airs, and at a later period sang folk-ballads or recited folk-tales, and thus prepared the way for that dramatic and oratorical talent for which the Celtic peoples and their descendants are still distinguished. As summarized by Brinton, "The Irish possessed a sparse literature, going back to the Eighth Century, and the Welsh to the Twelfth, while the oldest Scotch or Breton songs date at the farthest from the Fourteenth Century" (*Races and Peoples*, 1890, page 155).

Briefly, then, the Celtic tongues flourished before the beginning of written history, and contributed in important measure to the character and vigor of the Aryan tongues, as the vernacular of several of the most distinctive and diverse of the vigorous peoples of central and western Europe, up to a time well within the historical period. They give a stamp to early and even modern literature written in the English. Some of them survive as oral rather than literary languages, but all of them are gradually disappearing.

Of the voluminous literature relating to the Celtic-speaking peoples, the following may be noted as representative and useful: Brinton, *Races and Peoples* (New York, 1890); Rhys and Jones, *The Welsh People* (London, 1900); Thébaud, *The Irish Race* (Philadelphia, 1873); Beddoe, *The Races of Britain* (London, 1885); Logan, *The Scottish Gael* (London, 1855); Prichard, *The Eastern Origin of the Celtic Nations*, edited by Latham (London, 1857); Roemer, *Origins of the English People* (New York, 1887); Keane, *Man, Past and Present* (Cambridge, Eng., 1899); Ripley, *Races of Europe* (New York, 1899); Deniker, *The Races of Man* (London, 1900).

CELTIC VERSION. See BIBLE.

CEL'TIS. See HACKBERRY.

CEMBAL D'AMOUR, säN'bäl' dȧ'mōōr' (Fr., clavichord of love). A musical instrument belonging to the clavichord family, invented by Gottfried Silbermann early in the Eighteenth Century. Its form was that of an English spinet. The strings were twice as long as those of the ordinary clavichord; and when touched, the keys struck the central node of the string, both halves of which vibrated simultaneously, thus producing a double volume of sound. There were two bridges instead of one, as in the clavichord, and two soundboards, of unequal forms and dimensions. The cembal d'amour stands between the clavichord and the pianoforte.

CEM'BRA NUT. See PINE.

CEMENT (OF. *cement, ciment*, Sp., Portug., It. *cimento*, from Lat. *cæmentum*, rubble, from *cædere*, to cut). Any composition which at one temperature or degree of moisture is plastic and at another temperature and degree of moisture is tenacious, and which, because of these qualities, is employed for uniting metals, stone, glass, wood, or other materials. Solder, gums, putty, mucilage, glue, plaster of Paris, limes, and hydraulic cements are all comprehended in this definition. The most important class of cements, structurally and commercially, is that comprising lime, hydraulic lime, and hydraulic cement. The cements of this class will be described first.

Lime. Lime, common lime, quicklime, or caustic lime, as it is variously named, is produced by burning limestone in kilns until the carbonic acid has been driven off. The clinker resulting from this burning possesses the property of disintegration or slaking upon being treated with a sufficient quantity of water. The slaking of lime is due to its rapid hydration when in contact with water, and the process is accompanied by a material increase in volume and a considerable evolution of heat. If the quantity of water be just sufficient to cause the hydration of the lime, it is reduced to a dry powder, while if the water be in excess it becomes a paste. The slaked lime thus formed, when mixed to a paste with water and allowed to stand in the air, has the property of hardening and firmly adhering to any surface with which it may be in contact. This hardening of common limes will take place only in air. When lime is very pure and its activity is very great, it is known as fat lime; if the lime contains, either mixed with it or in combination, considerable amounts of inert impurities which lessen the activity of the lime, cause a partial loss of the property of slaking, and diminish its power of hardening, it is known as meagre lime. The common method of slaking lime consists in covering it with from two to three times its volume of water, and allowing it to stand until all the lumps are reduced and the mixture is in the condition of a thick paste. For use in construction, this paste is mixed with from two to three times its volume of sand, when it is called lime mortar. The process of hardening of lime mortar consists in the gradual formation of carbonate of lime through the absorption of carbonic acid from the air, accompanied by the crystallization of the mass of hydrated lime as it gradually dries out. The hardening process is a slow one at best, and the lime mortar used in the interior of thick masses of masonry, where the air cannot get at it, will take years to become hard. Lime mortar should be used only in masonry exposed to the air. See Building.

Hydraulic Lime. Hydraulic lime is obtained by burning limestone containing enough silica and alumina to impart to it the ability to harden under water. In calcination the silica and alumina combine with a portion of the lime to form silicates and aluminates of lime, leaving the remainder of the lime as free lime in an uncombined state. When treated with water the free lime is slaked. The manufacture of hydraulic lime is practically confined to Europe, and consists, after the quarrying of the rock, of burning, slaking, and bolting the material. The burning is accomplished in kilns, and is a process requiring considerable skill and careful attention. To slake the clinker it is spread in layers from four inches to eight inches deep and sprinkled with water. The object is to slake the free lime without hydrating the silicates and aluminates. After the lime has been reduced to powder by slaking, it is passed through sieves and packed for shipment. Hydraulic lime is used in the same manner as common lime, being mixed with water and sand to a paste. When in the air hydraulic lime acts like common lime, slowly absorbing carbonic acid, drying, and hardening. In water the action of hydraulic lime is altogether different from that of common lime, since, owing to the presence of the silicates and aluminates of lime, the hydraulic lime hardens under water, while the common lime does not.

Hydraulic Cement. Hydraulic cements are classified as natural cements, Portland cements, and puzzolanic cements. *Natural cement* is the product obtained by calcining at a low temperature a natural limestone without pulverization or admixture of other materials, and finely grinding the clinker. In Europe these cements are called Roman cements, and they were first manufactured in England in 1796, by James Parker. Natural cements began to be manufactured in France about 1825; in the United States natural-cement rock was discovered while building the Erie Canal in New York, in 1818. France and the United States are the principal producers of natural cement, their respective outputs being 2,000,000 barrels and 8,800,000 barrels annually. The principal centres of natural-cement manufacture in the United States are: Ulster County, N. Y.; Cumberland, Md.; Louisville, Ky.; Milwaukee, Wis.; and Utica, Ill. The rock employed is an argillaceous limestone. The process of manufacture consists in mining and quarrying this limestone; breaking it into lumps about the size of one's hand; calcining these lumps with coal in kilns, and finally crushing and grinding the clinker. Natural cements are characterized by a very rapid set and slowness in gaining strength subsequently; they have less strength than Portland cement.

Portland cement is the product obtained by calcining to incipient vitrifaction an intimate artificial admixture of two or more raw materials, and finally grinding the clinker. Chemically Portland cement is a combination consisting principally of silicates and aluminates of lime, and the raw materials must necessarily contain silica, alumina, and lime. Within these limitations, a great variety of raw materials are capable of being utilized for cement-making; in England chalk and clay are used principally; in Germany and France marl and clay and limestone and slate are employed. In the United States marl and clay, limestone and clay, and argillaceous limestone of different compositions are used. The first process in the manufacture of Portland cement is the mixing of the raw materials. This mixture must be uniform and homogeneous, and the respective ingredients properly proportioned, which requires that they be reduced to a fine powder. The method of reduction practiced depends upon the character of the raw materials; when soluble in water they are usually reduced by one of the wet processes. The wet process proper, formerly extensively used in England, consists in applying an excess of water to the clay and chalk, mixing them in a sort of pug mill to a thin paste, which is run into settling basins, where the water is decanted off as the solid matter settles until the mixture is dry enough to be cut into blocks or bricks.

In the semi-wet process only enough water is added to reduce the mixture to a plastic condition in the pug mill.

When hard materials incapable of dissolution by water are employed, they are ground dry in grinding mills, the powder being then either slightly moistened and made into bricks, or, where the rotary kiln is used, stored in powdered form. In the wet and semi-wet processes the bricks or blocks are dried and then burned in kilns, of which there are several varieties. (See KILNS.) In the dry process, drying preliminary to burning is usually unnecessary. In the United States, where the rotary kiln is used, the dry powder or the wet paste is run directly into the kiln without previous brick-making or drying. The burning or calcination is continued until incipient vitrifaction of the raw mixture occurs, the resulting clinker being dark-green or black in color. The clinker is crushed and then ground to an impalpable powder, when, after a period of curing, it is ready for use. (See CRUSHING AND GRINDING MACHINERY.) Extreme fineness of grinding is a prime essential of good Portland cement, many brands of which are ground so fine that from 90 to 96 per cent. of the powder will pass through a sieve having 10,000 meshes per square inch. Portland cement sets slower than natural cement, and attains a greater final strength.

Puzzolanic cement, or puzzolana, is a term applied to a combination of silica and alumina, which, when mixed with common lime and made into mortar, has the property of hardening under water. Natural puzzolanic cements have been used in Italy from very early times, and are made by grinding certain volcanic tufas and mixing the powder with slaked lime. These cements are still made and used in Italy and some other parts of Europe. The most commonly employed artificial puzzolanic cement is made from blast-furnace slag and lime. The hot slag, as it comes from the furnace, is run into cold water, and becomes granulated. It is ground to fine powder, and then this powder is ground with lime.

The chemical composition of three principal classes of cement is about as follows:

ELEMENT	Portland	Natural	Slag
Silica, per cent	20.3 to 26.1	21.1 to 35.4	18. to 28.
Alumina, " "	5.2 to 10.6	6.3 to 14.5	9. to 19.
Iron oxide, " "	2.1 to 5.3	1.7 to 5.1	0.33 to 2.8
Lime, " "	58. to 67.	32.3 to 53.5	36. to 55.
Magnesia, " "	0.33 to 2.3	1.44 to 20.9	0.5 to 7.
Sulphuric acid, " "	0.26 to 1.78	....	0.18 to 2.7

In addition to the three principal classes of hydraulic cements just described, there are several other classes of minor importance. *Mixed cements* include a considerable number of cements which are formed of admixtures of different grades of other cement; of the overburned or underburned portions of the clinker, or of foreign material added to the cement. *Grappiers cements* are made by grinding to powder the grappiers left from the slaking and bolting of hydraulic lime. Mixed cements and grappiers cements are European products solely. *Sand cement* is the name given to the material formed by grinding together Portland cement and sand to an extremely fine powder and a very intimate mixture. *Surki*, a cement much used in India, is made of one part slaked lime and one-half to one part of finely ground brick-dust.

When hydraulic cement powder is mixed with water to a plastic condition and allowed to stand, it gradually combines into a solid mass, and this process of combination is known as the *setting* of the cement. Cements of different characters differ very widely in their rate and manner of setting; some occupy but a few minutes in the operation, while others require several hours; some begin setting immediately, and take considerable time to complete the set, while others stand for a considerable time with no apparent action, and then set very quickly. After the completion of the setting of the cement, the mixture continues to increase in cohesive strength for a considerable period of time, and this subsequent development of strength is called the *hardening* of the cement. The properties of setting and hardening of cement by which a plastic paste is transformed into a hard stone are those upon which the value of cement as a structural material depends. Setting and hardening proceed under water as effectively as in air.

Previous to its use in structural work, cement is usually tested. The usual tests made are for specific gravity, fineness of grinding, rapidity of setting, tensile strength, and soundness. Other tests sometimes made are for compressive and transverse strength, adhesive strength, resistance to abrasion, permeability to water, and chemical composition. The test for fineness of grinding consists in determining the proportion of the cement powder which will pass standard sieves. The sieves commonly employed have 2500, 10,000, and 40,000 meshes per square inch, but the 40,000-mesh sieve is not frequently used in making ordinary working tests. The standard test for rate of setting consists in making cakes of neat cement about two or three inches in diameter and one-half inch thick to a stiff paste, observing the time when they will bear a needle one-twelfth inch in diameter, sustaining a weight of one-fourth of a pound, and noting this as the beginning of setting; then continuing the observations with a needle one-twenty-fourth inch in diameter, carrying a weight of one pound until the material is sufficiently firm to bear this, when it may be called fully set.

Tests for tensile strength are made by breaking test pieces, briquettes, whose smallest section is one inch square, in special tensile testing machines. The cement paste or mortar is made into briquettes in small molds, and is allowed to remain in the molds until set; the briquettes are then removed and kept in a moist atmosphere for 24 hours, and then immersed in water, where they remain until tested. Tests are usually made when the briquettes are 7 and 28 days old, and they consist in pulling the briquette in two and noting the pounds of pull required. Tests for soundness consist in placing cakes similar to those used in the test for setting in water and noting, after a few days, whether checks or cracks have developed, which indicate a tendency to disintegration. This is called the normal test for soundness; accelerated tests for soundness are sometimes made, and consist in immersing the cement cake in either hot or boiling water, or heating it in a hot kiln or in flame, and observing whether cracks develop. Considerable doubt exists as to the value of accelerated tests. Chemical analyses of a cement are of value chiefly as a check when the other tests indicate a doubtful cement.

The strengths commonly required by specifications in the United States are based upon the recommendations of the American Society of Civil Engineers, which give the following average value per square inch:

AGE OF BRIQUETTE	24 hours	7 days	28 days	1 year
Natural cement	40-80 lbs.	60-100 lbs.	100-150 lbs.	300-400 lbs.
Portland "	100-140 "	250-550 "	350-700 "	450-800 "

For use in structural work, cements are usually mixed with sand, to form mortar, or with sand and gravel or broken stone, to form concrete. (See MORTAR; CONCRETE.) The chief hydraulic cement producing countries of the world are Germany, France, England, and the United States, although it is manufactured to a greater or less extent by nearly all civilized countries. In 1900 the United States manufactured about 8,800,000 barrels of natural cement, 8,500,000 barrels of Portland cement, and 493,000 barrels of slag cement, valued at about $17,000,000. Germany produces over 20,000,000 barrels of Portland cement yearly, and England between 8,000,000 and 9,000,000 barrels. France makes annually about 3,000,000 barrels of Portland cement and 7,000,000 or 8,000,000 barrels of other cements. The principal uses of hydraulic cement are described in the articles on MORTAR and CONCRETE.

Besides hydraulic cements, there are a great variety of cementing compounds used for various purposes and derived from animal, vegetable, and mineral substances. Animal cements have gelatin and albumin as their basis, while the binding materials of vegetable cements are gums, resins, and wax. Some of these different cements are the following: A cement used for uniting slabs of marble, alabaster, and for many similar purposes consists of plaster of Paris mixed with water to the consistency of thick cream and then applied. The plaster of Paris may be mixed with thin glue, with diluted white of egg, or a solution of gum, instead of with water, and is strengthened thereby. A cement for pipe-joints is made of iron borings mixed with sal ammoniac and sulphur. This compound is mixed with enough water to moisten it, and then rammed tightly into the joint. The proportions recommended are 1 pound of borings, 2 ounces of sal ammoniac, and 1 ounce of sulphur. For mending earthenware and china, etc., a variety of cements are recommended. For ornamental glass or china which is not subjected to heat or rough usage, Canada balsam that has evaporated until rather hard is a very useful cement; from its transparency it makes an almost invisible joint. The surfaces should be slightly warmed and the balsam brushed over them, after which they should be kept pressed together for a short time. Thick copal or mastic varnish may be used in the same manner. Gum shellac, dissolved in alcohol in sufficient quantity to form a treacly liquid, forms a stronger cement than the above, but its color is objectionable for some purposes. The shellac may be dissolved in naphtha, but the cement thus produced is not equal to that in alcohol. The liquid glue sold in the shops is usually prepared in this manner; another kind is made of a mixture of the solutions of shellac and india-rubber. A cement which is sold in sticks consists of shellac or gum mastic fused and molded into a convenient form. It is applied by heating the surfaces to be joined just sufficiently to fuse the shellac and then smearing them thinly with it and pressing them together. If shellac is heated much above its fusing-point it becomes carbonized and rotten, and therefore great care must be used in fusing any composition of which it is an ingredient. *Marine glue*, a mixture of shellac and india-rubber, is an excellent cement, and, when applied with the precautions just alluded to, is so strong that glass or china cemented with it, and then allowed to fall or otherwise broken again, will give way in any part rather than that cemented. Ordinary glue, so much used by joiners and cabinet-makers, is common or impure gelatin (q.v.), obtained by boiling animal substances, as skins, hoofs, etc., in water. As glue dissolves in water, it is an efficient cement only in dry places. A cement which can be used for many purposes is made as follows: Curdle skim milk with rennet or vinegar, press out the whey, and dry the curd at a very gentle heat, but as quickly as possible. When it has become quite dry, grind it in a coffee or pepper mill, and next triturate it in a mortar until reduced to a very fine powder. Mix this powder with one-tenth of its weight of new, dry quicklime, also in very fine powder, and to every ounce of the mixture add five or six grains of powdered camphor; triturate the whole well together, and keep it in small, wide-mouthed vials, well corked. When required for use, make it into a paste with a little water and apply it immediately. *Cheese cement* is similar in composition and uses. Take two parts of grated cheese and one of quicklime, in fine powder; beat these together with white of egg to form a paste, and use immediately. *Cutler's cement*, used for fixing knives and forks in handles, is made of equal weights of rosin and brick-dust melted together; or, for a superior quality, four parts of rosin, one of beeswax, and one of brick dust. *Mahogany cement*, used for stopping cracks and holes in mahogany, may be prepared by melting four parts of beeswax with one of Indian red, and as much yellow ochre as is found requisite to give the color. If shellac be substituted for the beeswax, and less red used, a much better cement is made. *Mucilage* is a name applied to a great variety of sticky or gummy preparations used for fastening paper and other light materials together. It is sometimes a thickened aqueous solution of gum, and sometimes a preparation of dextrin, glue, or other adhesive materials generally containing some preservative substance or compound, as creosote or salicylic acid.

Bibliography. Among the best books treating of hydraulic cements are: Spalding, *Notes on History and Use of Hydraulic Cement* (Ithaca, 1893); Baker, *A Treatise on Masonry Construction* (New York, 1889); Candlot, *Ciments et chaux hydrauliques* (Paris, 1897). See, also, Building; Mortar; Concrete; Foundations; Masonry; Kilns.

CEM′ENTA′TION. In petrography, the process by which loose materials, such as sands, gravels, and fossil casts, are consolidated into firm rocks. Cementation is caused by the deposition of mineral matter from solutions which have penetrated the loose materials. By this process sands and gravels become quartzites and conglomerates, while the shells of fossils, if calcareous, yield limestones. The most common cementing substances are quartz, calcite, and iron ores. See Sandstone; Limestone; and Conglomerate.

CEMENTATION PROCESS, in Steel-Making. See Iron and Steel.

CEMETERY (OF. *cemetiere*, Lat. *cœmiterium*, Gk. *κοιμητήριον*, *koimētērion*, sleeping place, later graveyard, from *κοιμᾶν*, *koiman*, to put to sleep, from *κεῖσθαι*, *keisthai*, to lie down). A graveyard or other place of deposit for the dead. The term is used with particular reference to those extensive ornamental burial-grounds which have been established in the United States and other countries, as the practice of burying within and around churches has gradually been abandoned. (See Burial.) There was at first a natural feeling of regret at the prospect of deserting places of deposit for the dead so hallowed by ancient use and associations as the church and the churchyard, but in many instances such places were in reality surrounded by degrading, disgusting, and unsanitary circumstances. On the other hand, the new places of interment began to develop humanizing and elevating influences, in the way of beautiful trees and flowers, natural scenery, and artistic monuments. The fine burial-grounds of the Turks, extending over large tracts and adorned by cypress and other trees, may have suggested the desirability of such cemeteries to Europeans. Around Constantinople the cemeteries are located in vast tracts of woods under whose branches stand thousands of tombstones. It is the custom never to reopen a grave, and a new resting-place is given to every one, with the result that the dead now occupy a wider territory than that which is covered by the homes of the living. The Turks believe that until the body is buried the soul is in a state of discomfort, and the funeral therefore takes place as soon as possible after death. No coffin is used. The body is laid in the grave and a few rough boards placed about it and then the earth is shoveled in, care being taken to leave a small opening from the head of the corpse to the surface of the ground. This method, from a sanitary standpoint, is preferable to the custom of using double wood or even metallic coffins, for as little as possible should be done to interfere with the speedy dissolution of the body into its elements.

The famous Père Lachaise, in Paris, is the most celebrated of modern cemeteries, although by no means the largest. It was laid out in 1804, and comprises about 110 acres, and about 20,000 monuments erected to the memory of nearly all the great men of France of the Nineteenth Century. Twice this cemetery and the neighboring heights have been the scene of desperate fighting. In 1814, during the attack on Paris by the Allies, it was stormed by a Russian column; and in 1871 the Communists made their last stand among these tombs, where 900 of them were killed, 200 being buried in quicklime in one huge grave, and 700 in another. Paris has also the cemeteries of Montparnasse and Montmartre, besides many smaller burial-grounds. In 1874 a very large cemetery was laid out 16 miles north of Paris, covering nearly 1300 acres. In France every city and town is required by law to provide a burial-ground beyond its barriers, properly laid out and planted, and each interment must take place in a separate grave. This law does not apply to Paris, however. There the dead are buried 40 or 50 at a time in the *fosses communes*, or the cemeteries outside of the city limits, the poor being interred gratuitously, and a charge being made in all other cases. The *fosse*, when full, is left undisturbed for five years; then all the crosses and other memorials are removed, the level of the ground is raised four or five feet by fresh earth, and interments begin again. For 50 francs a grave can be leased for five years; but when permanent monuments are desired the ground must be purchased in fee. Pit-burial is also practiced in Naples and in other cities of Continental Europe. In one of the Neapolitan cemeteries a pit is opened each day in which all the burials of the day are made. At night a joint funeral service is held for all and the pit is filled, not to be opened for a year.

In English cities, about 1840, the people began to discuss the dangers to public health arising from the condition of the graveyards surrounding and the vaults within and underneath the great churches. In London these receptacles were literally crammed with coffins, and the surrounding air was infected to a dangerous degree. Coffins were piled upon each other until they came within a few inches of the surface of the ground, and then the ground was raised from time to time until its level came nearly up to the lower windows of the church. To make room for new burials old bones were thrown out, and this led to systematic robbing of graves for the sake of the coffin-plates and the ornaments sometimes buried with the bodies. The result of this action and discussion was an entire change in the system. Burials within the limits of the cities and villages were prohibited, and as a necessity rural cemeteries were founded. The chief cemeteries of London at present are: Kensal Green, on the Harrow Road, 2½ miles from Paddington; Highgate, on a slope of Highgate Hill; Abney Park, the Norwood, and Nunhead cemeteries, on the south; the West London Cemetery at Brompton; Ilford and Leystone cemeteries in Essex; the Victoria and Tower Hamlets cemeteries in East London; while farther from the city were laid out the cemeteries of Woking and Colney Hatch.

Of the cemeteries still in use in Southern Europe, the catacombs of Sicily are the most remarkable. In one of these, near Palermo, under an old Capuchin monastery, there are four subterranean corridors, in which more than 2000 corpses are ranged in niches in the wall, many of them shrunk into the most grotesque attitudes, or hanging with pendent heads or limbs from their receptacles. As a preparation for its niche, the body is desiccated in an oven, and then dressed as in life and put in its place in the wall. At one end of this cemetery there is an altar, strangely ornamented with a mosaic of human skulls and bones.

Campo santo (holy field) is the Italian designation for a cemetery or burying-ground, but more especially for an inclosed place of interment, surrounded internally by an arcade, and designed to receive the remains of persons of distinction. The most famous *campo santo*, and that from which the others derived the name, is that of Pisa—in the neighborhood of the cathedral and leaning tower, and consecrated to the memory of men who had deserved well of the republic. It was founded by Archbishop Ubaldo, toward the end of the Twelfth Century. The Archbishop, having been driven out of Palestine by Saladin, brought his fifty-three vessels, which had been destined for the conquest, laden with the earth of the Holy Land. This he deposited on the spot which was thence called the holy field, and which, as we have said, gave its name as a generic term to the burying-grounds of Italy. The architect of the existing building was Giovanni Pisano, under whose superintendence it was completed in 1283. It contains an area of over 400 feet in length and 118 feet in breadth, and is surrounded by a lofty wall, on the inner side of which a wide arcade runs round the whole inclosure, giving to it the character of one magnificent cloister. At the smaller eastern side there is a large chapel, and two smaller chapels of smaller size on the northern side. The lofty circular arches of the arcade are filled with the richest Gothic tracery, which belongs, however, to a later date—the latter half of the Fifteenth Century—and consequently formed no part of the original design. The walls are adorned with frescoes which are of great interest and value, both absolutely and with reference to the history of art. The oldest of those which have been preserved adorn one side of the eastern wall; they represent the passion of Christ, His resurrection, and other sacred subjects. These remarkable paintings are supposed to date from before the middle of the Fourteenth Century, and are ascribed to Buffalmaco. But the most marvelous productions are those of Giotto, of Simone Memmi, and of Andrea and Bernardo Orcagna.

America closely followed England in the sanitary reform of burial-places, and many years ago burial within certain limits of cities was prohibited except in special cases, such as the use of private vaults in churchyards. Within the limits of Greater New York, however, in the territory included in the Borough of Queens, and once forming the town of Newtown, there are, it has been estimated, 1800 acres of cemeteries, covering one-tenth part of a district which contains 25,000 living inhabitants and the remains of 1,000,000 dead.

The United States has more beautiful cemeteries than any other country. Conspicuous among these are the great national cemeteries located in a few Northern and many Southern cities, for the burial of soldiers, especially those who were killed in the Civil War. The oldest and one of the most beautiful of the great cemeteries in the United States is Mount Auburn, near Boston. Laurel Hill Cemetery, in Philadelphia, was opened in 1836. It is on the Schuylkill River, about four miles north of the centre of the city, and is part of a region of great beauty. This was followed by Greenwood Cemetery, the first and one of the largest burial-places for New York and Brooklyn, established by a company chartered in 1838. The grounds occupy a fine situation on the east side of New York Bay about three miles south of the city hall in Brooklyn. From the higher points of the cemetery, the eye takes in New York and Brooklyn, the bay, half a dozen cities in New Jersey, the far-off Palisades, the broad lower bay, the Highlands near Sandy Hook, Coney Island, and a grand view of the Atlantic Ocean. Lake View Cemetery, at Cleveland, Ohio, is one of the celebrated places of interment in the interior States, and contains the Garfield mausoleum.

The site of a cemetery is a matter of extreme importance. It should be situated as far as possible from any populous locality, in order that it may not interfere with the needs of the living, and so may remain undisturbed for the greatest possible length of time. The soil should be light and porous, permitting abundant entrance of water and accompanying air, to expedite decomposition. There should be good, natural underdrainage, but care should be taken that the drainage from cemeteries does not discharge directly into drinking-waters. The frequent proximity of cemeteries and reservoir sites is a fact to be deprecated. There should be strict municipal regulation of the depth and distance apart at which graves may be dug. The ownership of cemeteries is divided among municipalities, churches, and private corporations. In the Continental cities municipal ownership of cemeteries is the rule, although there are some private cemeteries, especially in Germany and Holland. In some cities, as Cologne, Naples, Dresden, and Rome, the management of funerals is also controlled by the municipality, the result being to decrease greatly burial expenses. British towns usually have municipal cemeteries, but most of them are old and little used, the newer burial-grounds being privately owned. Manchester, Nottingham, and several other of the larger towns have very recently taken steps to provide adequate municipal cemeteries.

In the United States the largest and most popular cemeteries are usually owned by private corporations. About half of the cities having a population of over 25,000 own cemeteries, but in all but fifteen of these there are also private cemeteries. The city of Boston is a notable exception to the general rule, controlling, as it does, many cemeteries. In 1897 it created a cemetery department, consisting of a commission of five trustees appointed by the mayor. It employs a superintendent at a salary of $2500, who keeps all records of burials and transfers. For information about ancient burial-places, see NECROP-

OLIS; GRAVEYARD. For information concerning burial customs, see BURIAL.

CEMETERY LAWS. Laws which have for their chief objects the selection, adornment, regulation, and protection of suitable burial-places for the dead. Cemeteries may be so located as to endanger health by corrupting air or water, and hence their location may be controlled either by the courts or by the legislature. In the United States cemetery associations are frequently incorporated under State statutes, and are generally exempted from taxation. The object of this exemption is not only to relieve such associations from the burden of taxation, but to secure burial-grounds from sale for the non-payment of taxes. From similar considerations, a burial-lot cannot be seized or sold for the debts of its owner, and if he executes a mortgage upon it, the transaction is void as against public policy, provided interments have been made therein. Cemetery lots in which burials have not been made, however, may be bought and sold, subject to the rules of the association controlling them. The desecration of cemeteries, as well as the unlawful interference with those who have vested rights in their use, are severely punishable. Consult Perley, *Mortuary Law* (Boston, 1896).

CÉNACLE, sā'nä'kl' (Fr., dinner-chamber, from Lat. *cenaculum*, dining-room, from *cena*, *cesna*, Umb. *çesna*, dinner). A name given to a Parisian literary group of varying constituency that began about 1826 to gather around Charles Nodier (q.v.) and sought to revive in French literature the old monarchical spirit, the spirit of mediæval mystery and spiritual submission. Of the First Cénacle, as it is called, the chief members were Vigny and the Deschamps brothers. These were soon joined by Lamartine, Hugo, and Sainte-Beuve, who describes the group as "royalists by birth, Christians by convention and a vague sentimentality." Their organ was *La Muse Française*. They soon grew iconoclastic toward classicism, and were led by the exigencies of controversy from their monarchical position to a democratic attitude. Lamartine and Hugo had favored the Bourbons. They now turned even from the Orleanists to the Revolution and Napoleon. Thus the Cénacle won the alliance of Musset, Mérimée, and the elder Dumas, and, after the Revolution of 1830, of Gautier and Gérard de Nerval. But with that year and the triumph of Hugo's *Hernani*, its reason for existence disappeared, and the spirit of individuality inherent in romanticism soon caused the Cénacle to dissolve in fact and as an influence.

CE'NA TRIMALCHIONIS, trĭ-mal'kĭ-ō'nĭs (Trimalchio's Dinner-Party). The most important episode in the *Satira* of Petronius. It is a vivid description of a dinner-party given by Trimalchio, a former slave, who had become very rich in trade. The lavish feast is described by a certain Encolpius, one of the guests, and the story is of value for the specimens of colloquial Latin, the *sermo plebeius*, preserved in it.

CEN'CHRUS. See BURGRASS.

CENCI, chĕn'chē, BEATRICE (1577-99). An Italian of the Sixteenth Century, the heroine of a celebrated tragedy in real life. She was the daughter of Francesco Cenci, a wealthy Roman nobleman, head of a family notorious for its crimes and profligacy. It had long been supposed that Beatrice was the victim of her father's brutal passion, and that this was her provocation for the murder of Francesco, a crime in which she was aided by several other members of the family. With her accomplices, she was executed in 1599. A famous portrait in the Barberini Palace, Rome, supposed to have been painted by Guido Reni, caused her to be known as the 'beautiful parricide.' One of Shelley's most powerful dramas, *The Cenci*, is founded upon the traditional story of Beatrice. It is now believed, however, owing to the researches of Bertolotti, that Francesco was much less of a monster than was supposed, and that Beatrice, even aside from the question of her share in the murder, was in character far from innocent; it further appears, according to Bertolotti, that she was not beautiful, and that the famous painting is not of Beatrice, nor by Guido Reni. Consult Bertolotti, *Francesco Cenci e la sua famiglia* (Florence, 1879); and for the traditional account, Muratori, *Annali d'Italia* (Milan, 1744-49).

CENCI, THE. A powerful poetic tragedy by Shelley (1819). Though written for the stage, and offered for presentation, the nature of the drama is such as to make its acceptance impossible.

CENEDA, chā-nā'dā. An Italian city. See VITTORIO.

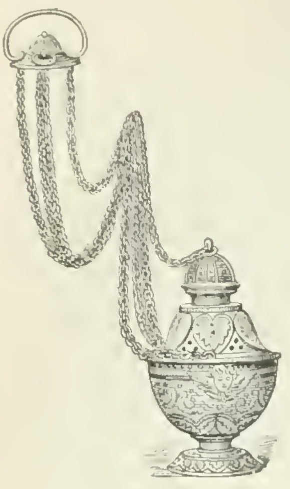
CENIS, se-nē', MONT, or MONTE CENISIO. A mountain of the Alps, between Savoy and Piedmont, on the frontier between Italy and France, forming part of the watershed between the valleys of the Dora Riparia and the Arc (Map: France, O 6). The culminating point of the pass over Mont Cenis reaches an elevation of about 6850 feet above the sea. The mountain is composed of schist, limestone, and gypsum, and is covered with a rich vegetation. The road over the pass, constructed in 1803-10, under Napoleon's orders, has a total length of 40 miles, and prior to the construction of the railway tunnel under the Col-de-Fréjus, about 14 miles southwest of Mont Cenis, was one of the most patronized routes across the Alps. The tunnel, constructed in 1857-70, is nearly 8 miles long and varies in altitude from 3775 to 4245 feet. The cost of construction was nearly 75,000,000 francs ($14,475,000). See TUNNELS.

CE'NOMA'NIAN (so called from the ancient Celtic tribe of *Cenomani*). The name given by the French to the lower portion of the upper Cretaceous period. It corresponds to the Dakota epoch of American geologists.

CEN'OTAPH (Fr. *cénotaphe*, Lat. *cenotaphium*, from Gk. *κενοτάφιον*, *kenotaphion*, empty tomb, from *κενός*, *kenos*, empty + *τάφος*, *taphos*, tomb). A monument which does not cover the remains of the deceased. Such were originally erected for those whose bones could not be brought home for interment, as for those who died in foreign parts or had perished at sea.

CE'NOZO'IC (from Gk. *καινός*, *kainos*, new + *ζωή*, *zōē*, life). One of the main divisions or eras of geological time, preceded by the Mesozoic era and followed by the Recent era. The term is used by some geologists to include the Tertiary and Quaternary periods, while others limit it to the Tertiary alone.

CENSER (abbreviation of *encenser*, OF. *encenser*, from Med. Lat. *incensare*, to burn incense, from *incensum*, incense, from *incendere*, to burn, from *in*, in + *cendere*, to burn). A vessel for burning perfumes (see INCENSE), also called 'thurible,' from *thus*, frankincense. It is tossed in the air ceremonially during public worship to diffuse the perfume of the incense. Censers were used from very early times in the Jewish services, and have been all along employed in those of the Roman Catholic and Eastern churches; also of recent years in the Episcopal Church. Little is known of their precise shape before the Twelfth Century, at which time they were richly decorated, and sometimes made in the form of small churches, as e.g. those in the cathedrals of Treves and Namur. They were also often shaped like a ball, with two hollow halves. In later specimens the upper half varies very much in form, being often surmounted by a turret. The lower half, resting on a foot, holds the charcoal and the incense, while the upper one is perforated to allow the smoke to escape, and moves up and down on three or four chains.


CENSER.

CEN'SO, *Sp. pron.* thān'sō. In Spanish law, an annual payment, in money or in produce, charged upon land for an indeterminate period. The Spanish civil code of 1889 (in force in Cuba, Porto Rico, and the Philippines) recognizes and regulates three classes of *censo*. *Censo enfiteutico* is the ground-rent paid by the holder of a perpetual lease. (See EMPHYTEUSIS.) *Censo reservativo* is an annual payment reserved by the conveyor of land and made a perpetual charge upon the land conveyed. *Censo consignativo* is an annual payment which the owner of land, in consideration of a capital sum paid him, has placed as a perpetual charge upon his land. In the first of these cases the recipient of the annual payment is titular owner (*dueño directo*). In the second and third cases he is not owner, but a creditor of the land; his claim runs against every person who takes the land by purchase, devise, or inheritance, and it is a lien upon the land. In all cases the *censo* may be redeemed (i.e. the land may be freed from the annual charge) by payment of the corresponding capital. In cases where this capital or redemption value is not indicated in the contract, it is estimated at the ratio of 100 to 3. The right of redemption may, however, be suspended by contract in the case of the purchased rent-charge (*censo consignativo*) for twenty years, and in the other cases for sixty years.

CENSOR (Lat., judge, from *censere*, to assess, judge). The name of two Roman officers of State. The office was established by Servius Tullius, the fifth King of Rome. After the expulsion of the kings, it was held by the consuls, special magistrates not being appointed till B.C. 443. It continued to be filled by patricians till B.C. 351, when Censor Marcius Rutilus, a plebeian, was elected. Twelve years later it was enacted that one of the censors (there were always two) must be a plebeian. In B.C. 131 both censors, for the first time, were plebeians. The censors were elected in the *comitia centuriata*, presided over by a consul. The term of office at first lasted five years, but was shortly afterwards limited to eighteen months. The censorship was regarded as the highest dignity in the State, except the dictatorship. It was a sacred and irresponsible magistracy, whose powers were vast and undefined, and whose decisions were received with solemn reverence. The duties of the censors were threefold: (1) The taking of the census, or register of the citizens and of their property; (2) the *regimen morum* (regulation of morals); (3) the administration of the finances of the State. The taking of the census was originally their sole function (hence their name), and was held in the Campus Martius, in a building called *villa publica*. The *regimen morum* was the most dreaded and absolute of their powers. It grew naturally out of the exercise of the previous duty, which compelled them to exclude unworthy persons from the lists of citizens. Gradually the superintendence of the censors extended from the public to the private life of citizens. They could inflict disgrace (*ignominia*) on any one whose conduct did not square with their notions of rectitude or duty. For instance, if a man neglected the cultivation of his fields, or carried on a disreputable trade, or refused to marry, or treated his family either too kindly or too harshly, or was extravagant, or guilty of bribery, cowardice, or the like, he might be degraded. The administration of the finances of the State included the regulation of the *tributum*, or property-tax; of the *vectigalia*, such as the tithes paid for the public lands, salt-works, mines, customs, etc., which were usually leased out to speculators for five years; the preparation of the State budget, etc.

CEN'SORI'NUS. A chronologist and grammarian of the Third Century A.D., known by a work called *De Die Natali*, in which he treated of man's generations, his natal hour, and the influence that the stars and genii exercise over his fate. Its chief value to us lies in the facts and dates derived from earlier authors whose works are now lost. It has been edited by Hultsch (Leipzig, 1867).

CENSORSHIP. The exercise of the duties or powers of a censor (q.v.). The term in its broadest application includes the general supervision and control of public morals and the public welfare, such as was exercised by the Roman censors. The term is now, however, almost exclusively applied to the examination of manuscripts, writings, and literary productions of all kinds as a condition of their publication, with the suppression of part or all, as may seem necessary to the censor or licensor, for the protection of public morals or the integrity of the government. The censorship of public morals, as such, does not now exist among civilized races in the form in which it was exercised by the Roman censors; but a supervision over the personal affairs and private conduct of the public is exercised, under various designations, in some of the semi-civilized or less advanced nations of to-day; thus, in Russia the conduct and acts of the people are subject to rigid rules and restrictions which are enforced by officials of arbitrary authority. In France, also, the authority of the *agent de mœurs* reaches to such matters as the supervision of the public spending of money beyond one's means. Sumptuary laws belong somewhat to the same class as those creating censorships of private conduct, and these have existed from time to time during the history of many modern civilized nations. See SUMPTUARY LAWS.

The advance of civilization and the development of the idea of the right to personal liberty is doing away with the censorship of private conduct in all of the civilized races; and the censorship of the press and of the drama are the most important relics of this class of public supervision of private conduct.

The censorship of the press was intended to prevent the publication and effect of literature supposed or believed to contain matter likely to corrupt morals or be subversive of the government. It came into existence with the invention of the printing-press, although in all despotic governments in the history of man writings offensive to the Government have been suppressed or destroyed, and in many cases the author punished as well, for the same motives as those which gave rise to the censorship of the press and of the drama. Literary censorship was rigidly maintained by the Roman Catholic Church as early as the year 1515, and all books published within its control were subjected to the strictest examination and expurgation or suppression when deemed necessary. (See INDEX and VATICAN.) The censorship of the press in England was strictly enforced as early as 1637 by order of the Star Chamber, which order was established by statute in 1662. It was against this statute that Milton wrote his *Areopagitica*, and the censorship was abolished in 1693. In France the censorship which had existed since the invention of the art of printing was abolished in 1789, and revived at intervals until 1830, when it was finally abolished. With the growth of the constitutional government in the States of modern Europe the censorship of the press has been abolished. For a fuller discussion and treatment of the subject, see FREEDOM OF THE PRESS.

Censorship of dramatic productions is based upon the necessity of protecting the public from the influence of immoral plays. This is accomplished in the United States by the law which enables any public immorality to be suppressed as soon as an overt act has been committed, which can be shown to be an offense against public morals. In England, however, a censorship of the stage exists under the provisions of 6 and 7 Vict., c. 68. Formerly, in the Seventeenth and Eighteenth centuries, the performance of plays was controlled by the Master of Revels and the Lord Chamberlain; and the statute 10, George II., c. 28, defined and established the duties and powers of the Lord Chamberlain in this capacity. Under this statute his powers were restricted as to their territorial limits; but by the statute 6 and 7 Vict. his jurisdiction is extended (by section 12) to the whole United Kingdom. Chapter 68 of this statute provides that one copy of every new stage play, every new act, scene, part, prologue, or epilogue, of a play, intended to be acted for hire at any theatre in Great Britain should be sent seven days previous to the Lord Chamberlain for his allowance, and he may license or refuse to license its production, and may revoke a license already granted, and forbid the production of the play whenever it appears to him advantageous for the preservation of good morals or decency or to preserve public peace. His authority is exercised upon the recommendation of his reader. He has no authority to license playhouses. This is vested in the County Council, who may delegate it to one of the justices of the peace, who formerly exercised it. See *The Law Magazine and Law Review*, 19, 220.

Something akin to censorship is to be found in the statutory and administrative restrictions on the use of the mails for the circulation of gambling and fraudulent circulars and obscene publications. The protection of the public, therefore, from wrongful publications is, in general, left in Great Britain and the United States to the enforcement of the laws protecting public and individual rights from violation; and so, the circumstances under which a publication is made may be such that the publisher may be enjoined by the court from further publication of the same matter, if this be necessary for the protection of violated rights.

Where a territory or country is under martial law censorship of the press by the military authorities is commonly exercised in all countries, so far as it is considered necessary by the military authorities. See COPYRIGHT; LIBEL; NEWSPAPER; MARTIAL LAW.

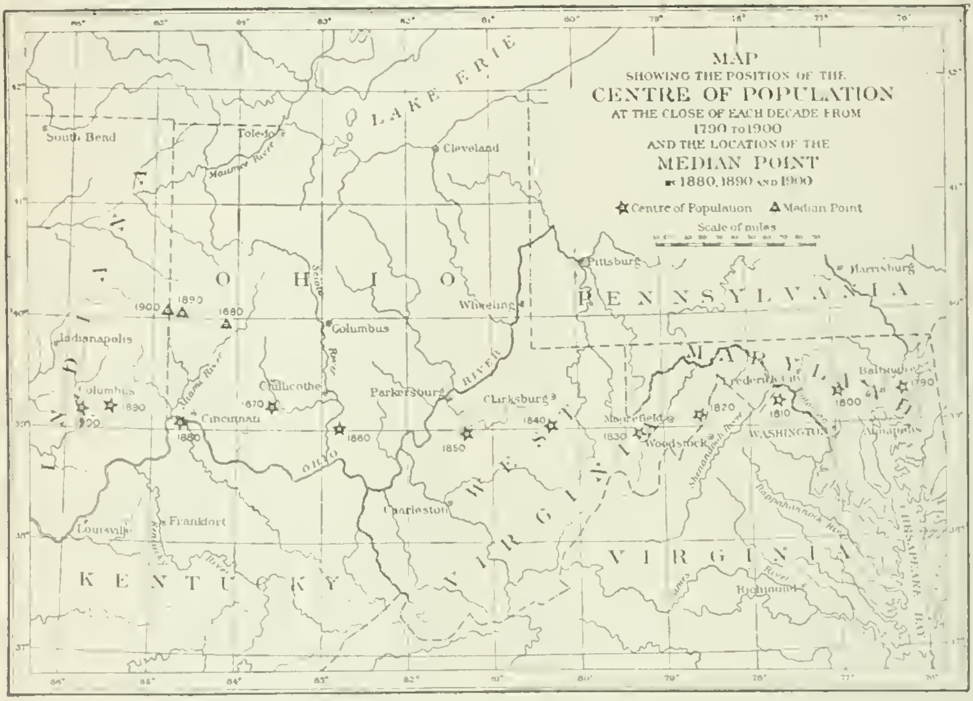
CENSUS (Lat., registration, from *censere*, to assess, to judge). The familiar use of the word census is to denote the periodical counting of the people, and this is its primary meaning. As the census of population has been usually accompanied by comprehensive investigations into agriculture, manufactures, etc., the term has come to be employed for any statistical investigation which proceeds by the method of direct interrogation. Used in this broad way the name census designates one of the two methods of statistical research, the other being registration. Census and registration are not interchangeable, but one is frequently used as a substitute for the other. A census portrays conditions at a given time, a register the changes which take place. As two successive censuses by comparison show the resultant of these changes, we can, under certain circumstances, by summing up the changes, arrive at the general condition of affairs without a direct enumeration.

Antecedents of the Census.—The origin of the American census in the well-known constitutional provision that representation and direct taxation should be proportional to population, suggests the intimate connection between census operations and government necessities. That similar necessities in early days gave rise to enumerations of the people will be readily understood. We find references to counting the people in our accounts of ancient peoples like the Hebrews and the Romans. China and Japan also have records of very early enumerations. These records seem to have been undertaken for fiscal or military purposes, to establish the ownership of landed property or to determine military contingents, and involved a count of the people not as the main issue but as an incident. In this they differed from the census operations of to-day.

This is likewise true of such records as that of the *Domesday Book* frequently pointed out as illustrations of statistical practice during the Middle Ages. Indeed, a direct enumeration of the whole people having no other object in view than to ascertain their number, first took place with the census of the United States in 1790, and the principal development of the census occurred in the Nineteenth Century. Before that time there had been, in several European States, efforts directed to ascertaining the number of the people or of particular classes. Perhaps the most comprehensive of these efforts took place in Sweden. In 1686 parish registers were introduced, in which not only births and deaths, but also arrivals and departures were to be noted. By means of these registers the number of the population was ascertained, and beginning with 1749 comprehensive statements for the entire land were published. Such population registers from which, in lieu of an enumeration, the number of the population can be ascertained, exist to-day in many places. It was mainly from such registers that the early notices of the population of Prussia and Austria were gathered. To them should be added the reports made from time to time by the administrative offices of the various districts of the number of persons, especially of those capable of bearing arms, under their jurisdiction. In all this we see the beginnings of the modern census.

Enumeration of Population.—The census has been a matter of slow growth. In its present-day form it involves a record of the salient facts pertaining to every person in the community, these facts being summarized for territorial and other groups. But it was a long time in coming to this point, and early records are oftentimes very summary.

The most usual form of the census is the census of population, recurring at regular intervals of five or ten years, as the case may be. The inauguration of regular census-taking by the United States in 1790 has already been noted. England, Holland, and Norway followed in 1801. In France a census took place in 1801, but after that irregularly until 1831, when the regular series begins. In Prussia a census was taken in 1816, but without any instructions to the local authorities, who were free to use their own discretion in the matter. It was hardly until the middle of the Nineteenth Century, as we shall see in reviewing the history of census-taking in the United States, that methods acquired stability.



Development of Population Census.—The progress of census-taking can be seen in an examination of the development of the census of the United States. That of 1790 was a model undertaking, whose results were fully stated in an octavo pamphlet of fifty-six pages, while the report upon population in the census of 1890 fills two quarto volumes, of 2181 pages. The census of 1790 recorded only the heads of families, dividing the members of the family into the following classes: free whites, males 16 years and over, males under 16 years, females, other free persons, and slaves. Until 1850 no essential change was made in the form of enumeration, though the classes were enlarged to embrace age, occupation, physical infirmity, and other data. By 1840 the schedule had grown so unwieldy that for each family there were as many as seventy spaces in which entries might be made. In this period there could be no tabulation of statistics in the modern sense of the word. No combinations other than those given in the original schedule could be made, and facts given under one head, e.g. age, could not be combined with those given under another, e.g. illiteracy. In 1850 a radical change was introduced, and for the first time every inhabitant was recorded by name, the questions being answered for each person specifically, and not for the family group of which he was a part. This change in the manner of asking the questions necessitated the establishment of a central office in Washington in which all the schedules were gathered and the tabulations made. The collection of the figures was in the hands of the United States marshals until 1880, but since that date has been in charge of the Census Office, and considerable improvement in the quality of the returns has resulted. The census of 1900 was taken under a law of 1899, which notably improved the mechanism of census-taking in minor points.

Census Methods.—The operations of the census are manifold, and can be stated only in the briefest manner. Preliminary steps are the preparation of the schedules and the division of the country into enumeration districts. The schedules are sometimes minutely prescribed by law, but the better way is for the act to enumerate the points to be covered and leave the formulation of the questions to the experience and discretion of the census authorities. The country must be divided into well-defined enumeration districts, containing approximately the same number of persons, and not too extensive to be fully covered by the enumerator in the time allotted to him. In countries where the census is taken in a single day, the districts must of necessity be smaller than in the United States, where two weeks are given the enumerator in cities, and a month in rural districts. After he has completed his work his papers are sent to Washington for examination and tabulation. In 1890 the work of tabulation was done by electrical machines, the invention of Mr. Herman Hollerith. These machines have now acquired a permanent place in census work. The facts recorded on the schedules are drawn off by a punching machine on cards, where each perforation represents some one of the characteristics noted on the schedules. Such a card is prepared for each individual. The cards are placed in a holder and brought into contact with a large number of points corresponding in location to the perforations. If there is a hole in the card the point passes through, establishes a current, and makes a record upon a recording dial. The points which touch the cards at places where there are no perforations are pushed back by springs and return into place when the card is taken out. By means of this machine the count is made with unerring accuracy and the number of combinations of the different data is greatly increased. It will be readily understood, if it has not been expressly stated, that a modern census of population is something more than a statement of the number of the people. The facts usually embraced in census inquiries relate to sex, race, age, nativity, citizenship, conjugal condition, occupation, literacy, and, in foreign countries, religious belief. The geographical distribution of the people gives another and most important element. These various elements in conjunction with the geographical detail furnish an almost endless variety of combinations. The result is a minute analysis of the population from these various points of view.

The Scope of Census Enumerations.—The decennial census authorized by the Constitution has from the beginning been utilized to secure information beyond the mere number of inhabitants, which would have satisfied the constitutional requirement. This tendency showed itself first in the elaboration of the population schedules already noted, but as early as 1810 additional inquiries were added. As time progressed these became very numerous, and reached their culmination in 1890, when, among twenty-five volumes which contained the results of the census, two only relate to the count of the population. The multiplication of inquiries was thought to retard the progress of the main investigations, and by the law governing the census of 1900, the enumeration was limited to population, mortality, agriculture, and manufactures. The law stipulated, moreover, that the work should be complete in two years and the publication in January, 1902, of the first volume of the population report promises the fulfillment of the requirement. We may turn now to a brief consideration of the lines of inquiry represented in the census of 1900. The obvious value of mortality statistics has led, in the United States, to the attempt to gather them through the census. The question as to the deaths which had occurred during the census year first appeared in 1850, and has not since been omitted. The returns are notoriously defective, and it is usually recognized among statisticians that accurate figures can only be obtained by systematic and continuous registration. The widespread interest in vital statistics is probably responsible for the maintenance of this inquiry among the census schedules. The only valuable part of these volumes is that which assembles the results of the registration records from those parts of the country where they exist. But the attempt to gather general mortality statistics in this manner flouts the distinction between census and registration noted in the beginning of this article.

Agriculture first appeared as a subject of inquiry in 1840, when a few general questions as to the value of farm crops were asked. In 1850 we find a special schedule for farmers, but the range of the inquiry was not materially increased though the form of question was much improved. In 1880 the scope of the inquiry was greatly widened and special inquiries concerning cereals and forestry were undertaken. The development of the census has been more in the detail of publication than in change of method.

The history of manufacturing statistics dates back to the census of 1810. Without instructions or definite schedules, the marshals were directed to report upon the manufactures in their districts. The mass of heterogeneous material which resulted could not be gathered together into statistics, though they formed the basis for a general statement by Mr. Tench Coxe, in which estimate and conjecture were freely used to supplement defects of the data. The following census of 1820 had a better schedule, but results were hardly more satisfactory. Indeed so general was the discontent with the figures that in 1830 the inquiry was abandoned. While an attempt was again made in 1840 to collect such statistics, it was not until 1850, with a reorganized census service, that valuable results were secured. The separate schedule for manufacturing and mechanical industries adopted in 1850 was in form substantially the same as that now in use. It has been gradually expanded and improved. In 1880 the industrial schedules were confided to special agents in cities and manufacturing districts. With the census of 1880 were incorporated a large number of special inquiries, and for the more important industries a mass of specifically appropriate matter was collected.

Among the subjects of census inquiry in 1880 and 1890 we find, in addition to those above described, defective classes, crime, pauperism, and benevolence, mines and mining, fish and fisheries, social statistics, education, insurance, mortgages, farm and home proprietorship and indebtedness, churches, transportation, wealth, debt and taxation, social statistics of cities and Indians.

Bibliography. The fullest account of the census of the United States is found in an official publication, Wright and Hunt, *The History and Growth of the United States Census* (Washington, 1900). Consult, also: *The Federal Census*, by a Committee of the American Economic Association (New York, 1899); Falkner, "The Development of the Census," in *Annals of the American Academy of Political and Social Science* (Philadelphia, 1898). For the methods of European countries, the most useful compilation is Bodio, *Studi preparatorii per il IV. censimento decennale della popolazione del regno* (Rome, 1892), the author of which was the Director of the Italian Statistical Bureau. Dr. Bertillon, chief of the Municipal Statistics of Paris, has published *Statistique internationale résultant des recensements de la population dans les divers pays d'Europe* (Paris, 1899), a compilation of the results of European censuses of population.

CENT (Fr. *cent*, from Lat. *centum*, hundred). A coin of the United States valued at the one-hundredth part of a dollar. The division of the coinage unit into hundredths is quite frequent; and names indicating this division are found in the *centime* of France, the *centesimo* of Italy, the *centavo* of the South American republics, and the *cent* of Holland. In Belgium the coins of one and two centimes are popularly known as cents. In the United States the use of the word cent dates from the act of Congress of 1786 which adopted the dollar of one hundred cents as the coinage basis of the United States. While in Colonial times dollars (Spanish) were frequent in the circulation, the minor coins in use were either English coppers or home-made substitutes for them. In 1787 a mint established by Congress at New Haven, Conn., began coining what are known as the 'Fregio' or 'Franklin' cents, which were issued for many years. In 1791 a coin bearing a head of Washington and the words 'one cent' was struck in England as a pattern piece, and in 1792 another, without the word 'cent,' both of these meeting with the President's modest disapproval. In 1792 (April 2) Congress authorized the issue of a copper cent of 264 grains, and a half-cent in proportion. These appeared in 1793, the cent being reduced to 208 grains. In 1796 (act of January 26) the weight of the cent was reduced to 168 grains and the half-cent was proportionately reduced, a new design being adopted also. The head of Liberty was changed in 1808, and again in 1816. In 1815 and 1835 no copper coins were issued. By act of March 3, 1851, a three-cent coin, three-fourths silver, was authorized, and in 1853 its weight was reduced from 12⅜ grains to 11.52 grains. By the act of February 21, 1857, the half-cent was discontinued, and the old copper cent was replaced by a smaller coin, composed of .88 copper and .12 nickel, and weighing 72 grains. In 1864 (act of April 22) the bronze cent was introduced, weighing 48 grains, and consisting of .95 copper and .05 tin and zinc. By the same act the one and two cent coins were made a legal tender for sums not exceeding 10 and 20 cents respectively, and the coinage of two-cent pieces to weigh 96 grains was authorized. In 1865 (act of March 3) the one and two cent coins became each a legal tender to the amount of 4 cents only, and a three-cent coin was authorized, to consist of three-fourths copper and one-fourth nickel, to weigh 30 grains, and to be legal tender for any sum not exceeding 60 cents. In 1866 (May 16) a new act provided for the coinage of a five-cent piece, three-fourths copper and one-fourth nickel, to weigh 77.16 grains, and to be a legal tender for any sum not exceeding $1. The 'Coinage Act of 1873' (February 12) discarded the two-cent piece and limited the issue of coins of the denomination of cent to a five-cent piece and a three-cent piece (three-fourths copper and one-fourth nickel, and weighing 77.16 and 30 grains respectively), and a one-cent piece (.95 copper and .05 tin and zinc, weighing 48 grains). The coins authorized by this act were made a legal tender at their nominal value for any amount not exceeding 25 cents in any one payment. The minor coinage was further simplified by the discontinuance of the three-cent piece by act of September 26, 1890. The cents issued in 1793, 1799, and 1804, and the copper cent of 1856 are very rare, as are the half-cents of 1793, 1831, 1840-48, and 1852. See Numismatics.

CENTAU'REA (Neo-Lat., from Lat. *Centauria*, Gk. κενταύρειον, *kentaureion*, from Gk. κένταυρος, *kentauros*, centaur). A genus of plants of the natural order Compositæ, containing at least 400 species of annual and perennial herbaceous plants, chiefly natives of the Mediterranean regions and Australia. The bluebottle, or corn-bluebottle (*Centaurea cyanus*), is common in grain-fields in Europe, and has escaped from gardens in parts of the United States. The juice of the florets of the disk, with a little alum, dyes a beautiful and permanent blue. The large bluebottle (*Centaurea montana*), a native of central Europe, is frequently cultivated in flower-gardens. Its flowers are considerably larger, and it is a perennial. Sweet sultan (*Centaurea moschata*), a native of the Levant, with fragrant flowers, is also common in flower-gardens. It is an annual or biennial. Several species having the involucre spiny bear the name of star-thistle, *Centaurea calcitrapa* being most widely known.

CEN'TAURS (Lat. *Centauri*, Gk. Κένταυροι, *Kentauroi*, of uncertain etymology). A race of monsters, half man and half horse, which Greek legend localized in Thessaly. Such monsters are very early represented in Greek art, armed with a double-headed axe or branches of trees, and frequently in combat with an archer. Two types may be distinguished. In one a human body from the waist upward is joined to the body and four legs of a horse; in the earlier type the fore legs are also human, and the hinder parts only are equine. Greek legend knows two good centaurs, Chiron (q.v.) and Pholus; but the others are represented as savage and lustful. They appear most often in battle with the Lapithæ (q.v.), or with Hercules. In later art they appear in the Dionysiac circle, drawing the chariot of the god, plagued by Cupids, or in company with satyrs and nymphs. The etymology and original meaning of the name are wholly uncertain. It is possible that they are a personification of the winter torrents so common in Greece and often very destructive.

CENTAUR.

CENTAU'RUS (Lat., from Gk. *Κένταυρος*, *Kentauros*). The Centaur, one of the constellations in the Southern Hemisphere, represented on the celestial globe by a form half man and half horse. The principal star in this constellation, *α* Centauri, has been found to have the largest parallax (q.v.) of any fixed star. In other words, *α* Centauri is nearer to us in space than any other star. The difficulty of measuring stellar distance is so great, on account of the extreme delicacy of the necessary observations, that it was not until 1838 that such measurements were rendered possible by Bessel (q.v.), who determined the parallax of 61 Cygni with great precision. In the very next year Henderson, at the Cape of Good Hope Observatory, measured the parallax of *α* Centauri, but his results have since been replaced by the more accurate recent heliometric observations of Gill and Elkin, made at the same observatory. These astronomers make the distance 4.4 light-years, a 'light-year' being the distance traversed by light in one year. When we remember that light moves with a velocity of 186,330 miles a *second*, we can form some idea of the immense distance separating us from our nearest neighbor among the fixed stars.

CEN'TAURY (Lat. *centaurio*, Gk. *κενταύρειον*, *kentaureion*, from Gk. *κένταυρος*, *kentauros*, centaur: so called because it was supposed to have healed the wounded foot of the centaur Chiron), *Erythræa*. A genus of plants of the order Gentianaceæ, having a funnel-shaped regular five-partite corolla. The species are pretty little annuals, natives chiefly of the temperate parts of Europe and Asia, with pink or rose-colored flowers. They possess the tonic and other medicinal virtues of gentian, and although not frequently administered by physicians, are an important domestic medicine; and the tops are collected, when the plant is in flower, by the country people both in England and on the Continent of Europe, to be employed in cases of dyspepsia, in intermittent fevers, and as a vermifuge. They contain a substance called *centaurin*, the hydrochlorate of which is said to be an excellent febrifuge. The common centaury (*Erythræa centaurium*) is the species most frequent in Great Britain, a plant of eight inches to a foot in height, with flowers collected in loose heads, growing in dry pastures. Two or three other species are found on sandy seashores. Nearly allied to these is the American centaury (*Sabbatia angularis*), an annual plant with an erect, quadrangular stem, extensively distributed throughout the United States and Canada, and much used in the domestic practice of America as a prophylactic against autumnal fevers in strong infusions and large and repeated doses. There are more than a dozen species of Sabbatia in the United States, and the European species of centaury are introduced to some extent in waste grounds.

CEN'TENARY (Lat. *centenarius*, consisting of a hundred, from *centeni*, numbered by hundreds, from *centum*, hundred). A hundred of anything; a period of a hundred years; but usually employed to denote the commemoration of an important event. The centenary of American independence was celebrated by a *centennial* exhibition in 1876; the *bi*-centenary of Pope's birth in 1888; the *ter*-centenary of Shakespeare's birth in 1864; the *octo*-centenary of the Bologna University in 1888. See MILLENARY.

CENTENNIAL EXHIBITION, INTERNATIONAL. An international exhibition of arts, manufactures, and products of the soil and mines, held in Philadelphia, Pa., from May 10 to November 10, 1876. The exhibition was designed as a celebration of the one hundredth anniversary of the Declaration of Independence, and to illustrate the progress and industrial development which had taken place since that event. The project was originally proposed by an association of citizens of Philadelphia in 1870, and was officially authorized by Congress on March 3, 1871, when a centennial commission, of which Joseph R. Hawley became president, was named by President Grant. This commission, on May 12, 1873, appointed Alfred T. Goshorn director-general, under whose immediate direction the various subordinate officers were then chosen. The funds for the exhibition were obtained from the following appropriations: City of Philadelphia, $1,500,000; State of Pennsylvania, $1,500,000; Congress, $1,500,000; and private subscriptions, $2,300,000. A site in Fairmount Park, comprising an area of 236 acres, was inclosed, within which more than 200 buildings were erected. Of these, the Main Building, a structure of iron and glass, was designed for the exhibition of manufactures, products of mines and metallurgy, and various objects showing the development of science and education of all nations. It covered an area of 20 acres, and was 1880 feet long by 464 feet wide; Machinery Hall, next in size, was 1402 feet long by 360 feet wide, and was constructed of wood, with iron ties and struts into large traces upon piers of solid masonry; Agricultural Hall was 820 feet long by 540 feet wide, and was of wood and glass; Horticultural Hall, of iron and glass, in the Moorish style of architecture, was 383 feet long by 193 feet wide; and Memorial Hall, of granite, glass, and iron, in the modern

Renaissance style of architecture, was used as an art gallery, and was 365 feet long by 210 feet wide and 89 feet in height, costing $1,500,000. This building was constructed in permanent form, and has since been used as an art museum. The smaller buildings were erected at the expense of various countries, States, and individual firms. In accordance with an act of Congress of June 5, 1874, the President invited foreign governments to be represented and take part in the international exhibition. Forty-nine foreign governments and dependencies responded to this invitation; and many, in addition to sending important exhibits of their products, erected buildings on the grounds for the use of their respective commissions.

The exhibits, of which there were upward of 50,000, were classified in 36 groups, each of which was subdivided into classes, and these in turn were again subdivided into smaller divisions. They were examined by a jury of awards, of which Francis A. Walker was chief, composed of 233 judges, of whom 118 were foreign and 115 American. Awards, consisting of a diploma and a medal, were granted to 13,104 exhibitors, 7802 being given to foreign countries and 5302 to the United States. The total number of admissions was 9,910,966, of which 8,004,274 were paid. The largest number of persons admitted on any one day was on Pennsylvania Day (September 28), when 274,919 persons entered the grounds. During the exhibition the Governors of the various States were invited to accompany excursions to the fair, where usually receptions were held in the State buildings. By such means, interest was stimulated, and citizens generally took advantage of these excursions to visit the exhibition. Representatives from each State and Territory were invited to deliver addresses upon its history, progress, present condition, and resources; also various organizations held meetings on the exhibition grounds on special days. There were, also, the following official ceremonies connected with the exhibition: Opening exercises, on May 10; centennial celebration of the Declaration of Independence, on July 4; distribution of awards to exhibitors, on September 27; and closing exercises, on November 10.

The Centennial Exhibition marked an important stage in the industrial development of the United States, as well as in the growth of industrial expositions generally. Coming, as it did, at a time of prosperity following the Civil War, it offered an opportunity for individual manufacturers to show the great advances that had been made under the stimulus of the demands of active trade. It was, moreover, the first opportunity where the products and manufactures of every section of the United States were so brought together as to give a concrete representation of the material resources and capacities of the nation as a whole. The international aspect given to the exhibition by the coöperation of foreign countries served to emphasize the closer commercial relations that were being established between the United States and various distant nations. From South America and the Far East came extensive exhibits; and it may be mentioned as a single consequence that articles of Japanese manufacture became well known in the United States for the first time, and soon entered into extensive use for decorative and other purposes. The fine quality of many goods exhibited by European makers was impressed upon American manufacturers, and an important result was the tendency to adapt their labor-saving and more rapid machinery to the manufacture of higher grades and more ornamental products. The bringing together of important works of art also was an event of importance to the American people, whose art galleries and academies were at that time in little more than a formative state. Greatest of all the lessons learned from the exhibition was the realization, not only of the great progress, but of the extended and diverse resources of the nation, together with its homogeneity and potentiality in industrial matters, in spite of the then recent war, devastating a large and important territory. As the exhibition was visited by numerous visitors from abroad, these facts were equally patent to them and served to demonstrate to the world the extent of the development of the United States. Regarded in its larger aspect, the Centennial Exhibition illustrated conditions existing at a time when the changes wrought by the development of rapid communication and the extended use of mechanical power in various industries were clearly indicated. The railway, telegraph, and post-office had already bound the world closely together, so that a more intimate acquaintance among nations and easier interchange of goods was possible. The use of steam and inventive genius had effected transformations in manufacturing, and the methods in vogue in the United States were now brought to the serious attention of Europe. As an exhibition, the Centennial was organized on a larger scale and on a more truly international basis than any previously attempted, and as a result its success was extraordinary. Being the first exhibition of the kind in the United States, it paved the way for subsequent undertakings which have proved as successful. See EXHIBITIONS, INDUSTRIAL.

The history of the exhibition is given in a series of nine volumes published by the Department of State (Washington, 1880), of which Vols. I. and II. are devoted to the reports of the director-general and the chiefs of the bureaus of administration; Vols. III. to VIII., which were edited by Francis A. Walker, to a description of the exhibits; and Vol. IX., a quarto volume, by Dorsey Gardner, to the grounds and buildings.

CENTENNIAL STATE. Colorado. See STATES, POPULAR NAMES OF.

CENTENO, thân-tā′nô, DIEGO (1505-49). A Spanish soldier, born at Ciudad Rodrigo. In 1534 he went with Pedro de Alvarado to Peru, where he contended against the elder Almagro at Las Salinas (1538), and the younger Almagro at Chapas (1542); made himself master of part of the country by killing the tyrannical Almadras; and in 1544 declared against Gonzalo Pizarro. He was, however, several times defeated by Carvajal, and, his army being disbanded, was compelled to seek refuge in a cave near Arequipa. On the arrival of Gasca, the envoy of Charles V., Centeno collected an army in support of the Royalist cause in Charcas, but was again defeated (October 20, 1547) by Pizarro and Carvajal at Huarina. In the following year he contributed to the final defeat of Pizarro, toward whom he displayed more clemency than did the other Royalists. His death, at La Plata, is said to have been caused by poison administered at a banquet by officers who feared the revelations which he had purposed to make to the King.

CENTER. See CENTRE.

CENTERING. See CENTRING.

CEN′TERVILLE. A city and the county-seat of Appanoose County, Iowa, 90 miles southeast of Des Moines, on the Chicago, Rock Island and Pacific, the Keokuk and Western, and the Iowa Central railroads (Map: Iowa, D 4). Coal and limestone underlie the vicinity, and large quantities are shipped. Pork-packing and the exportation of live stock are prominent industries, and there are manufactures of lumber, flour, iron, and other articles. The city has a park and a public library. Settled in 1847, Centerville was incorporated in the following year. Its government is administered by a mayor, elected biennially, and a city council. Population, in 1890, 3668; in 1900, 5256.

CENTERVILLE. A town and the county seat of Queen Anne County, Md., 30 miles east by north of Annapolis, on the Corsica River, at the head of navigation, and on the Queen Anne's and the Philadelphia, Wilmington and Baltimore railroads (Map: Maryland, N 4). The town is surrounded by a fertile agricultural and peach-growing district, and has carriage-works, machine-shops, flour-mill, canning-factory, creamery, shirt-factory, etc. The water-works are owned by the municipality. Population, in 1890, 1309; in 1900, 1231.

CENT-GARDES, säx′gärd′. The title of a special body-guard instituted by Louis XI. of France in 1474, consisting of 100 nobles, acting as guards of the palace, each of whom maintained two archers. The latter were later developed into the *gardes du corps*. The Cent-Gardes were disbanded in 1727 by Louis XV., restored by Napoleon III., and finally dissolved at the fall of the Empire.

CENTIGRADE SCALE (Fr., from Lat. *centum*, hundred + *gradus*, degree). A scale for thermometers where the zero is fixed at the freezing-point of water, and the 100° point at the temperature at which water boils under a pressure of 760 millimeters (30 inches). See THERMOMETRY and THERMOMETERS.

CENTIME, säx′têm′ (from Lat. *centesimus*, hundredth, from *centum*, hundred). In the French monetary system, the hundredth part of a franc, or two mills.

CENTIPEDE, or **CENTIPED** (Lat. *centipeda, centupeda*, from *centum*, hundred + *pes*, foot). Centipedes belong to the order Chilopoda, one of the two principal groups of the Myriapoda, and in some places are popularly known as 'galley-worms.' They have fewer segments in the body than the Chilognatha, the millipedes, in which respect they more closely approach spiders and insects; a centipede, indeed, is like a primitive insect in structure. The form of the body is flattened, has more concentration headward than in the millipedes, and each segment bears one pair of legs. In counting the segments, the ventral surface should be observed, for the dorsal shields often overlap. The head, covered by a flat shield, bears a pair of long antennæ, a pair of small, strong mandibles, and a pair of under jaws; and it contains poison-glands, the venom being emitted through a pair of modified legs.

Habits and Habitat.—Centipedes are active and ferocious. All are fond of dark and damp places, and stay by day under stones and bark, in decaying wood and leaves, or in loose soil. They go in search of food by night, devouring worms, mollusks, and insects, which they are able to pursue with much persistence, guided almost wholly by the sense of touch, for their powers of vision are at the best poorly developed. Only one family, Scutigeridæ, has compound eyes. In the other forms the eyes are simple or absent. According to Plateau, centipedes can distinguish light from dark, but, since they are night prowlers, the blind forms seem to get on as well as the others. As destroyers of insects, etc., centipedes are, therefore, of practical importance to agriculture. The smaller forms seldom, if ever, bite man, and the poison is never fatal. The bite of the large tropical forms, however, is painful and serious. According to Humboldt, the children of South American Indians tear off the head and eat the remainder of the body.

Classification and History.—Four families are distinguished—namely, Scutigeridæ, Lithobiidæ, Scolopendridæ, and Geophilidæ. To the Scutigeridæ belong long, stout myriapods, and the genus Scutigera is distinguished by its long legs, but is rare in the United States north of New York City. The body of the Lithobiidæ is unevenly jointed. The genus Lithobius is of world-wide distribution, *Lithobius forficatus* inhabiting both Europe and America. The Scolopendridæ usually have four ocelli and from 17 to 20 jointed antennæ. To the genus Scolopendra the large-jointed centipedes belong, such as the giant centipede (*Scolopendra gigantea*) of tropical America and the West Indies. The Geophilidæ have from 30 to 200 segments, the typical genus (Geophilus) inhabiting both Europe and America, under stones and decaying wood. One European species is phosphorescent. The centipedes appeared later in geological times than the millipedes. A Geophilus occurs in the Lower Carboniferous of Nova Scotia and the coal formations of Germany, and the order is well represented in Tertiary times. Compare MILLIPEDE; and for bibliography, etc., see MYRIAPODA.

CENTLIVRE, säx′tlē′vr′, SUSANNA (c.1667-1723). An English dramatic authoress, the daughter of a Lincolnshire gentleman named Freeman, born (most probably) in Ireland. Her early history is obscure; but when sixteen years of age she won the heart of a nephew of Sir Stephen Fox, who, however, died shortly after their marriage. Her second husband (an officer named Carrol) lost his life in a duel. Left in extreme poverty, his widow endeavored to support herself by writing for the theatre, and after producing a tragedy called *The Perjured Husband*, made her appearance on the stage. She afterwards married (1706) Joseph Centlivre, principal cook to Queen Anne. Of her plays, *The Busybody*, in which the leading character, Marplot, is highly amusing (1709); *A Bold Stroke for a Wife* (1718); and *The Wonder* (1714), though not distinguished by purity of style or truthfulness of portraiture, are lively in their plots, and have kept their place on the stage. Her collected *Dramatic Works* appeared in 1761 (3 vols.); new edition containing an account of her life (London, 1872).

CENT NOUVELLES NOUVELLES, sän noo̅′vĕl′ (Fr., hundred new stories). A collection of French tales, many of them taken from the works of Italian novelists, first printed by Vérard, in an undated folio, from a manuscript of the year 1456. Boccaccio and Poggio are the principal sources. The tales were originally written for the Court of Burgundy, probably at the direction of Philip the Good. Antoine de la Salle had some part in collecting and editing them. They were republished in Paris in 1858, under the editorship of Thomas Wright. They are marked by an extremely cynical and obscene wit.

CEN′TO (Fr. *centon*, It. *centone*, from Lat. *cento*, patchwork, Gk. *κέντρων*, *kentrōn*, patchwork, from *κέντρον*, *kentron*, pin, from *κεντεῖν*, *kentein*, to prick). A name applied to literary trivialities in the form of poems manufactured by putting together distinct verses or passages of one author, or of several authors, so as to make a new meaning. After the decay of genuine poetry among the Greeks, this worthless verse manufacture came into vogue, as is proved by the *Homerocentones*, a patchwork of lines taken from Homer (edited by Teucher, Leipzig, 1793); but it was much more common among the Romans in the later times of the Empire, when Vergil was frequently abused in this fashion, as in the *Cento Nuptialis* of Ausonius (who gives rules for the composition of the cento), and especially in the *Cento Vergilianus*, constructed in the Fourth Century by Proba Falconia, wife of the proconsul Adelfius, and giving, in Vergil's misplaced words, an epitome of sacred history. The cento was a favorite recreation in the Middle Ages. In the Twelfth Century a monk named Metellus contrived to make a cento of spiritual hymns out of Horace and Vergil. Consult Delepierre, *Tableau de la littérature du centon* (London, 1874-75).

CENTO, chĕn′tō. A city in northern Italy, 16 miles north of Bologna, situated in a fertile plain, on the left bank of the Reno (Map: Italy, F 3). It has a former palace of Count Chiavelli-Pannini, and in the churches are many paintings by Guercino, whose interesting home is still shown, and whose statue adorns the principal square. Cento is connected by canal with San Giovanni and with Ferrara, and is a hemp and rice market. Population (commune), in 1881, 17,000; in 1901, 19,118.

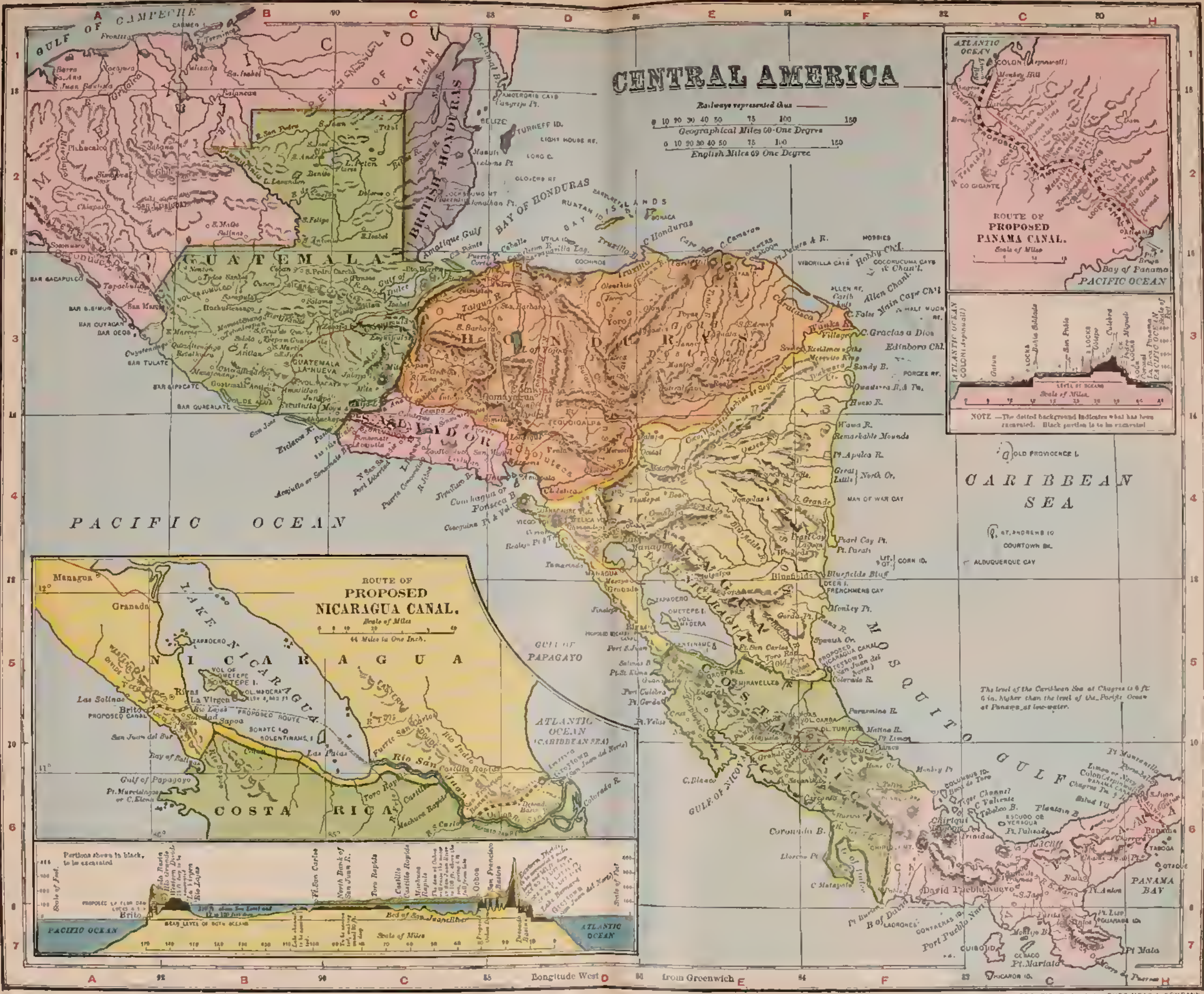
CENTO′NES HOMER′ICI (Lat., Homeric centos, translation of Gk. *ὁμηροκέντρωνες*, *homērokentrōnes*, or *ὁμηρόκεντρα*, *homērokentra*, from Ὅμηρος, *Homēros*, Homer + *κέντρων*, *kentrōn*, cento). A poem founded on the life of Christ and written in Homeric hexameters. It dates probably from the Fifth Century, and was printed by Aldus in 1501, and by Stephens in 1568. It has been ascribed to the Empress Eudocia.

CENTO NOVELLE ANTICHE, chĕn′tô nô-vĕl′lȧ än-tē′kȧ (It., hundred new stories). A collection of tales belonging to Italy and the Thirteenth Century. They are founded variously on historical events and mediæval romances and tableaux. See ITALIAN LANGUAGE AND LITERATURE.

CENTORBI, chĕn-tōr′bē. The former name of the Sicilian city Centuripe (q.v.).

CENTRAL AMERICA. That portion of the American continent between Mexico on the north and Colombia on the south, embracing the States of Costa Rica, Nicaragua, Salvador, Honduras, and Guatemala, and the Colony of British Honduras (Map: World, America, J 8—special map). It extends from latitude 8° to 18° 30′ N., and has an area estimated at about 181,500 square miles. Where it joins the Isthmus of Panama the distance between the Atlantic and Pacific is reduced to about 75 miles. It is in general a mountainous region, the elevations reaching about 13,000 feet in the north, and over 11,000 feet in the south. The interrupted mountain chain along the west coast is, in a sense, the connecting link between the cordilleras of North and South America. The chain includes numerous volcanoes, which have ejected enormous quantities of lava and ashes. There are two extensive lakes, those of Nicaragua and Managua. The west coast of Central America is bold and steep, but most of the eastern coast lies at low altitudes. The population is chiefly of mixed Spanish and Indian blood. The prehistoric remains are of great interest. See ARCHÆOLOGY, AMERICAN.

HISTORY. The coast of Central America was first sighted by Columbus on his fourth voyage, in August, 1502. After 1513 a part of what is now Costa Rica was conquered by Pedro Arias de Avila. From 1522 to 1525 the country was in dispute between Avila and Cortés, who, after the conquest of Mexico, dispatched Alvarado to subdue Guatemala (1523-24). Cortés himself invaded the country in 1524-25, completing its subjugation. All of Central America constituted the Captain-Generalcy of Guatemala until 1821. In that year Guatemala proclaimed its independence, and in 1822 the five audiencias, corresponding to the present five States, were united to the Mexican Empire of Iturbide. They regained their independence soon after, and in July, 1823, constituted themselves the Republic of the United States of Central America. From the first there was a bitter conflict between the Federalist element, which was strongest in Honduras, and the Conservative Party, comprising the clergy and the old Spanish bureaucracy, which were opposed to centralization, their stronghold being Guatemala. The struggle between these two elements has persisted to the present day, and has shown itself in the numerous unsuccessful attempts to establish a federated Central America. The Liberals were in the ascendent up to 1839, under the leadership of General Morazón. In 1839, however, the union was dissolved, as the result of the successful uprising of the Conservatives of Guatemala under Carrera. General Morazón made an attempt to restore the Federal Republic, but was captured and shot in Costa Rica in 1842. In that year a new union of all the States, excepting Costa Rica, was brought about, but this was dissolved in 1845. Costa Rica, in general, took very little part in the political affairs of Central America. In 1850 Honduras, Salvador, and Nicaragua endeavored to restore the Republic by force, but their armies were overthrown in the following year by Carrera. It was during the period of disturbances which followed the victory of Guatemala that the filibuster Walker (q.v.) made his audacious attempts to seize the Government of Nicaragua (1856) and Salvador (1860). Of subsequent efforts to establish a fed-



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erated republic in Central America, the most important were those of Barrios, President of Guatemala, who resorted to force (1885) and perished in the attempt, and the peaceful union formed in 1895 by Nicaragua, Salvador, and Honduras, which combined to form the Greater Republic of Central America, with provisions for the admission of Guatemala and Costa Rica. A constitution was adopted, and went into effect on November 1, 1898, but one month later, owing to the dissatisfaction of Salvador, the union was dissolved. Great Britain, in 1665, extended her protection to the Mosquito Coast, which was relinquished in 1850. Through colonization British Honduras was established in that year. See America; British Honduras; Costa Rica; Guatemala; Honduras; Nicaragua; Salvador; Mosquito Coast.

CENTRAL CITY. A city and county-seat of Gilpin County, Col., 40 miles west by north of Denver, on the Colorado and Southern Railroad (Map: Colorado, E 2). It is the centre of supply for a rich mining district, and is engaged in gold-mining. The first discovery in the State of gold in paying quantities was made at Central City; it was settled in 1859, and was incorporated in 1864. The government is administered by a mayor, annually elected, and a city council. There are municipal water-works. Population, in 1890, 2480; in 1900, 3114.

CENTRAL CITY. The county-seat of Merrick County, Neb., 132 miles west of Omaha, on the Platte River, and on the Union Pacific and the Burlington and Missouri River railroads (Map: Nebraska, F 2). Population, in 1890, 1368; in 1900, 1571.

CENTRAL FALLS. A city in Providence County, R. I., 4 miles north of Providence, on the Blackstone River, and on the New York, New Haven and Hartford Railroad (Map: Rhode Island, C 2). It has extensive manufactures of cotton, woolen, and silk goods, haircloth, and machinery. Central Falls has a public library and parks, and obtains its water-supply from Pawtucket, though it owns the pipe system by which the water is supplied. The city, formerly included in the town of Lincoln, was incorporated in 1895, having been settled in the Eighteenth Century. Under its present charter, the mayor is elected annually, and the city council is a bicameral assembly. The executive, with the consent of the board of aldermen, nominates police officers, and the school committee is chosen by popular election; except in these departments, all officials are selected by the council. Population, in 1900, 18,167.

CENTRAL FORCES. Forces which produce on a moving body an acceleration toward a fixed point called the 'centre of force.' Illustrations are afforded by the motion of a stone whirled in a sling, by the motion of the moon with reference to the earth, or of the earth with reference to the sun. It is evident, since the line of action of the force is through a fixed point, that the moving body will always move in a definite plane, and that the moment of the force around a line through the fixed point perpendicular to this plane being zero, there is no change in the angular momentum around this line. (See Mechanics.) This leads at once to what is called the principle of the 'conservation of areas,' or the statement that, if a radius vector be drawn from the fixed point to the moving body, it will describe equal areas in equal intervals of time; thus, the nearer the body is to the centre, the greater must be its speed.

It can be shown further that, if the force is an attraction varying inversely as the square of the distance from the centre to the body, the orbit of the body will be an ellipse, hyperbola or parabola, depending upon the conditions under which the motion may be regarded as being started, the centre of the force being a focus. If the orbit is elliptical, it may be shown that the square of the period of revolution of the body in its orbit is proportioned to the cube of the major axis of the ellipse. See Tait and Steele, *Dynamics of a Particle* (London, 1856).

The great astronomer Kepler, in 1609, by a careful consideration of the observations of Tycho Brahe on the motions of the planets, deduced the fact that these motions obeyed the three laws stated above; that is, they satisfy the conservation of areas, their orbits are elliptical about the sun as a focus, and the squares of their periods are proportional to the cubes of the major axis of the orbit. These are, therefore, often called 'Kepler's laws.' Sir Isaac Newton some years later showed that these laws were a necessary consequence of his principle of universal gravitation, which states that any two particles of matter act upon each other with a force of attraction which varies directly as the product of the masses of the particles and inversely as the square of their distance apart, and of the further principle that a large spherical body acts upon outside points as if its matter were concentrated at its centre.

CENTRA'LIA. A city in Marion County, Ill., 62 miles east of Saint Louis, Mo., on the Illinois Central, the Jacksonville and Saint Louis, the Southern, and the Illinois Southern railroads (Map: Illinois, C 5). It is the centre of a noted fruit-growing country, and has a large trade in fruit, especially apples and strawberries. Coal-mining is another important industry, and there are also the repair-shops of the Illinois Central Railroad, flour-mills, glass-works, and manufactures of boxes, crates, pick-handles, and envelopes. The city owns and operates its water-works, and has a large city hall, a Carnegie public library, and parks. Settled in 1853, Centralia was incorporated in 1859, and is now governed under a charter of 1872, since amended at various times, which provides for a mayor, elected biennially, and a city council. Population, in 1890, 4763; in 1900, 6721.

CENTRAL INDIA POLITICAL AGENCY. The official name for a group of feudatory States in the centre of India, the principal of which are Gwalior, Indore, Rewah, Bhopal, Bundelkhand, Baghelkhand, and West Malwa. The total number, including the smaller States, is over seventy, covering about 90,000 square miles. Population, in 1891, 10,318,812; in 1901, 8,501,883.

CENTRALISTS. A political party in Mexico, and some of the South American republics, which advocated the centralization of the government, as against a federalization of separate States. It has been a factor in Mexican politics since 1823; and the fight for the ascendency between it and the Federalists has caused many revolutions in Spanish-American countries. See Centralization; also Mexico.

CENTRALIZATION. In political theory, a term used to denote the tendency on the part of a central authority to reserve to itself increasing powers of legislation and administration. More strictly interpreted, the word centralization is capable of bearing a double meaning. It may signify the complete unification of a political entity as opposed to a loose assemblage of quasi-independent members. In this sense we speak of a strongly centralized federal government as opposed to a mere confederation of States. In this sense, too, the term might be used to describe the lax organization of the mediæval State in which the element of nationality was practically made impossible by the feudal system. In its second meaning, centralization in a State already completely unified would describe the concentration of governmental functions in the supreme Government in matters even of local interest. In no State, of course, is there any example of an absolutely centralized government, since in the nature of things some degree of power must be delegated to authorities provincial, municipal, and local, and thus in Russia, which stands as a type of autocracy, we find large powers of self-government enjoyed by the rural communes especially. In proportion only as the tendency toward centralization is stronger than the spirit of local self-government, can a government be spoken of as centralized or not. In ancient Rome the *municipia* possessed a very large measure of self-government under laws emanating from Rome. At the same time, so far as the broader aspects of government were concerned, the Empire was thoroughly centralized and was ruled from the Urbs as a unit. In the Middle Ages the power of the central governments, wherever there were such, was naturally small, and the privileges of provincial divisions, towns, and communes proportionately large. Powers which are at present conceded to be within the province of the sovereign, even in the least centralized of modern States, such as the administration of public charity and public education and of justice, were, during the Middle Ages, relegated to the clergy and the territorial lords respectively. The growth of modern States has been in fact simply a great centralizing movement, but in certain countries the process of centralization has been more complete than in others. England stands as a type of the first class in which a way seems to have been found for reconciling a strong central organization with wide powers of local self-government. France may be taken as a type of the second class, where the administration even of communal affairs is in large measure regulated by the central Government. In general, it may be said that the Latin countries, in which the traditions of the Roman Empire and the influence of the civil law are most strong, are more highly centralized than the northern nations of Europe. The extreme tendency on the part of a government to arrogate to itself functions belonging to small groups of inhabitants may, when applied to individuals, assume the character of paternalism or State socialism.

CENTRAL PARK. See New York City.

CENTRAL PROVINCES. A chief-commissionership of British India, created in 1861, and embracing the former Province of Nagpur, the two territories of Sagar and Nerbudda, and other territories added since (Map: India, D 4). It is bounded by the Central India Agency and Chota-Nagpur on the north, Orissa on the east, Madras on the southeast, and Hyderabad, Berar, and Bombay on the southwest and west. Its total area is 115,936 square miles, of which the portion under direct British administration contains 86,617 square miles. The surface is covered with numerous hilly ranges, among which the chief, the Satpura range, enters from the west, runs in an easterly direction, and has numerous offshoots. The northern part belongs to the basin of the Nerbudda and forms a valley of about 10,000 square miles, with an average elevation of 1000 feet above sea-level. The portion south of the Satpura range is watered by the Wardha, Wainganga, and the Mahanadi rivers, and contains most of the cultivable land of the province. All of these rivers are navigable for some distance except during the dry season.

The climate is hot and dry, and the rainfall is generally satisfactory, but the soil absorbs the moisture so quickly that artificial irrigation becomes necessary in cultivation, and this is supplied mostly by tanks. Of the total area of the British possessions in the provinces, only about one-fourth is cultivated, while the rest is either unfit for cultivation or covered with forests and jungle. About one-third of the total area under cultivation consists of rice-fields, while the remainder is under wheat and other food grains, oil-seeds, and cotton. The mineral deposits consist chiefly of coal and iron. The manufacturing industries are but little developed and consist chiefly in the production of cotton goods and iron articles. The Central Provinces are traversed by two almost parallel railway lines in the north and in the south, connecting Bombay with Calcutta and Allahabad.

The administration consists of a chief commissioner assisted by a secretary and a number of commissioners in charge of different departments. The British possessions are divided into the four divisions of Nagpur, Jabalpur, Nerbudda, and Chhattisgarh, each in charge of a commissioner. The tributary States are fifteen in number.

Education is partly aided by the Government and partly private. There are about 2300 schools of all kinds, of which only 300 are in the native States. The population of the British territory was 10,784,294 in 1891, and 9,845,318 in 1901. The native States had a population of 2,160,511 in 1891 and 1,983,496 in 1901. Nearly 82 per cent. of the population is Hindu; over 16 per cent. Animistic, and the remainder is made up of Mohammedans, Jains, and Christians. The chief town and seat of administration is Nagpur (q.v.).

CENTRAL STATE. Kansas. See States, Popular Names of.

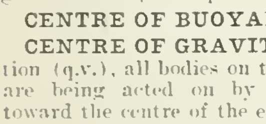
CENTRAL STATIONS. See Electric Lighting; and Telephone.

CENTRARCHIDÆ, sĕn-trär′kĭ-dē (Neo-Lat., from Gk. *κέντρον*, *kentron*, spine + *ἀρχός*, *archos*, anus). A family of fresh-water fishes of North America. It includes the various bass, sunfish, etc., all fishes of regular, well-balanced form, marked by a spot on the operculum. There are about thirty species, all gamey and voracious, and food-fish of considerable importance. They build nests by cleaning away an area of gravel or sand, and watch them until the young are able to swim. See BASS; BREAM; CALICO-BASS; CRAPPIE; ROCK-BASS; SUNFISH, etc.

CENTRE (Fr. *centre*, Lat. *centrum*, Gk. κέντρον, *kentron*, centre, from κεντεῖν, *kentein*, to prick). A term variously used in mathematics. (For *centre of a curve*, see CURVES.) *Centre of a pencil*, the vertex of a pencil of lines in a plane. Similarly the vertex of a sheaf of lines is called the centre. *Centre of involution*, a point in a range of points in involution such that the product of its distances from any two corresponding points is constant. *Centre of curvature* of a plane curve at any point, the centre of the osculating circle (q.v.). Similarly the centre of curvature of a surface is the centre of the osculating sphere. *Centre of perspective, homology, collineation*, the point in which all lines joining pairs of corresponding points in perspective figures are concurrent. In case the figures are congruent the centre of perspective is called the centre of symmetry. (For *centre of similarity*, or *similitude*, see SIMILARITY.) *Centre of mean position* or *mean centre of points on a line*, a point from which the algebraic sum of the distances to the given points is zero. The mathematical notion of centre of mean position corresponds to the mechanical idea of centre of mass and centre of gravity: e.g. the mean centre of the vertices of a triangle, i.e. the centroid, corresponds to the centre of mass of a homogeneous triangular plate.

CENTRE OF BUOYANCY. See BUOYANCY.

CENTRE OF GRAVITY. Owing to gravitation (q.v.), all bodies on the surface of the earth are being acted on by forces drawing them toward the centre of the earth. These forces are all sensibly parallel, owing to the large size of the earth compared with that of most natural objects, and produce what is ordinarily called 'weight.' The weight of any particle of matter whose mass is m is therefore equal to mg, where g is the acceleration which the body would have toward the earth if allowed to fall freely. The value of g is proved by experiment to be the same for all kinds and quantities of matter, but to vary from point to point on the earth's surface. Any large body may be considered as made up of parts, all being acted upon by parallel forces, and the resultant of these forces will be the weight of the body, and will be a force whose value, position, and direction are given by the ordinary laws for compounding parallel forces. (See MECHANICS.) The point in the body (or in space connected with the body) through which this resultant always passes, however the body is turned or placed, is called its 'centre of gravity.' Thus, if m_1 and m_2 are the masses of two small bodies, which may be called 'particles,' kept at a distance h apart, their centre of gravity may be calculated as follows: Through any point O in the vertical plane including the particles, draw two straight lines, OX and OY, at right angles and parallel respectively to the vertical lines representing the weights of m_1 and m_2. Let x_1 and x_2 be the perpendicular distances of m_1 and m_2 from OY; then, by the law of parallel forces, the resultant of the two forces m_1g and m_2g is a parallel force $(m_1+m_2)g$ at a distance x from OY, where

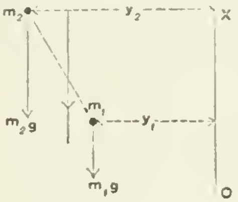


$$x = \frac{m_1gx_1 + m_2gx_2}{(m_1+m_2)g}$$

Hence

$$x = \frac{m_1x_1 + m_2x_2}{m_1+m_2}$$

Now, if the two bodies be moved in space, still keeping their distance h apart, OX and OY moving with them, they can be so placed that OX is now vertical, as in the diagram. Call the distances of m_1 and m_2 from OX y_1 and y_2. The resultant now is a force $(m_1+m_2)g$ parallel to OX, and at a distance y such that



$$y = \frac{m_1gy_1 + m_2gy_2}{(m_1+m_2)g}$$

Hence

$$y = \frac{m_1y_1 + m_2y_2}{m_1+m_2}$$

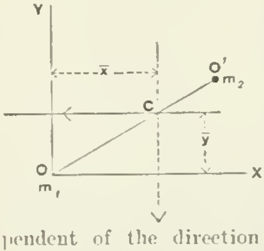
It is evident from geometry that in both cases the resultant passes through a point on the line joining the two particles whose distance from the one of mass m is

$$\frac{m_2}{m_1+m_2}h$$

This may be shown by choosing 0 to coincide with the particle whose mass is m. In that case $x_1 = 0$, $y_1 = 0$, and therefore

$$x = \frac{m_2}{m_1+m_2}x_2\,,\ y = \frac{m_2}{m_1+m_2}y_2$$

And so, by similar triangles, these conditions are satisfied by a point C on the line OO¹ such that



$$\overline{OC} = \frac{m_2}{m_1+m_2}\overline{OO}^1$$

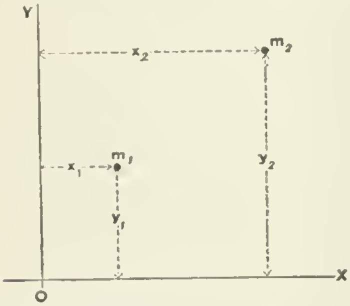
This point is, therefore, the centre of gravity, being independent of the direction of the line OO¹. It is evident, further, from these equations for x and y, that the centre of gravity coincides with the 'centre of inertia' (q.v.). The centre of gravity of any number of particles may be found in a perfectly similar way. For a uniform straight wire or rod the centre of gravity is its middle point; for a triangular plane figure it is the intersection of the three bisectors of the sides drawn from the opposite vertices; for a homogeneous pyramid it is the point of intersection of the lines drawn from each vertex to the centre of gravity of the opposite face.

If a solid body is suspended by a string fastened to it, or if it is balanced on a point, the line of action of this upward supporting force must pass through the centre of gravity, if the body is at rest. This gives, therefore, a direct method of determining the position of the centre of gravity of a solid by experiment: Suspend it by a string or balance it on a point, draw in the body a vertical line passing through the point of support; suspend the body by fastening the string to a different point, or balance it with another portion of the body resting on the pivot, draw in the body a vertical line through the new point of support; the intersection of these two lines is the centre of gravity.

CENTRE OF GYRATION. It is proved in mechanics (q.v.) that the moment of inertia of any rigid body about an axis through the centre of inertia may be written Mk^2, where M is the mass of the body. k is called the 'radius of gyration' for that particular axis. A point in the body at a distance k from this axis, and so situated that the line joining it to the centre of inertia is perpendicular to the axis, is called the 'centre of gyration.' If the whole mass of the body were concentrated into a particle at this point, and connected by a cord without mass to the axis, it would have the same energy of rotation as the original body if it had the same angular motion. It is obvious that there will be different radii and centres of gyration for different axes of rotation.

CENTRE OF IMPACT. The mean point of impact, or the mean of all the hits, when a projectile strikes a target a number of times. It is a point of the mean trajectory. See BALLISTICS; and GUNNERY.

CENTRE OF INERTIA (Lat. *inertia*, inactivity, literally unskillfulness). The centre of inertia of two particles whose masses are m_1 and m_2 is defined as follows: Draw in the plane which includes the two particles two lines OX and OY at right angles to each other; let the distances of the particles from OX be y_1 and y_2, and from OY be x_1 and x_2; then the centre of inertia is such a point that its distances from OY and OX are given by the equations



$$x = \frac{m_1 x_1 + m_2 x_2}{m_1 + m_2}$$

$$y = \frac{m_1 y_1 + m_2 y_2}{m_1 + m_2}$$

It is evident from these equations that this point coincides with the centre of gravity (q.v.); and that if the distance between the particles is h, the centre of inertia is upon a line joining the two particles at a distance equal to $\frac{m_2}{m_1 + m_2} h$ from the particle m_1.

This is at once evident if the line OX is chosen to pass through both particles, and if O is made to coincide with the particle whose mass is m_1. In this case $y_1 = y_2 = 0$, hence $y = 0$; $x_1 = 0$ $x_2 = h$, hence $x = \frac{m_2}{m_1 + m_2} h$

In a perfectly similar manner, the position of the centre of inertia of any number of particles or of a solid body made up of particles may be calculated.

The physical properties of the centre of inertia are most interesting. They are as follows: (1) If a blow or a force is applied to a body in such a direction that the line of action passes through the centre of inertia, the whole body will receive a velocity in the direction of the force; there will be no rotation, and the velocity and acceleration will be exactly what they would be if the same blow or force were applied to a single particle whose mass equals that of the body. (2) If the line of action does not pass through the centre of inertia, there will be rotation exactly as if the centre of inertia were pivoted; but the body will also move as a whole so that the centre of inertia will describe the same path as it would if the line of action of the force had passed through it. These two properties give a simple, self-evident method of locating the centre of inertia of a body by direct experiment: Place it on a smooth table, and by trying different directions determine one such that a blow in this direction produces no rotation, simply translation; draw a line in the body marking this direction; locate another similar line, and the centre of inertia is where these two lines intersect.

Illustrations of these two general properties of the centre of inertia are numerous. If a man falls from a building without striking the wall in his descent, his centre of inertia describes a vertical line, however he twists or turns. If a hammer is thrown obliquely upward in the air, it will revolve rapidly; but one point of the hammer—viz. its centre of inertia—will describe a smooth curve, called a parabola, which a single particle would describe if it were thrown upward in the same manner. When a bombshell explodes in its flight, the fragments fly off in different directions; but their centre of inertia at any instant is on a parabola, the same that it would have followed if there had been no explosion. See MECHANICS.

CENTRE OF OSCILLATION (Lat. *oscillatio*, a swinging). The period of oscillation of a simple pendulum—i.e. of a minute particle of matter vibrating through a small amplitude at the end of a fine thread which is supposed to be without weight, is given by the formula:

$$T = 2\pi\sqrt{\frac{l}{g}}$$

where $\pi = 3.1416$, l is the length of the thread, and g is the acceleration of a falling body due to gravity. Thus, the period varies as the square root of the length of the pendulum. If, however, the vibrating body is a large solid oscillating about a fixed axis, the period of oscillation is given by the formula

$$T = 2\pi\sqrt{\frac{I}{Mgh}}$$

where I is the moment of inertia around the axis of suspension, M is the mass of the body, and h is the perpendicular distance from the axis of suspension to the centre of gravity of the body.

If each particle of the vibrating body were separately connected with the axis of suspension by a fine thread and entirely disconnected from the rest of the body, it would form a simple pendulum; but in general its period would not be that of the body itself. Those nearest the axis of suspension would also vibrate in a shorter time than those farther away. As a rule it is possible, however, to find a series of particles which, vibrating as simple pendulums, would have the same period as that of the body. Their distance from the axis of suspension is evidently given by the condition

$$\frac{l}{g} = \frac{\mathrm{I}}{\mathrm{M}gh}$$

or

$$l = \frac{\mathrm{I}}{\mathrm{M}h}$$

If a line can be drawn in the body parallel to the axis of suspension, at the distance l from it, and so that the plane of the two lines includes the centre of gravity, it is called the 'axis of oscillation,' with reference to the given axis of suspension. It may be shown that if the body be suspended so as to vibrate about the axis of oscillation, the former axis of suspension will be the new axis of oscillation, and the period of vibration is the same in both cases. The intersection of the axis of oscillation by a plane passing through the centre of gravity and perpendicular to the axis is called the 'centre of oscillation.'

CENTRE OF PERCUSSION (Lat. *percussio*, a beating, striking). If a rigid body is suspended so that it can turn freely about a fixed axis —e.g. a door—a 'line of percussion' is such a line that a blow struck the body in that direction produces no reaction of any kind on the axis. In general, when a blow is struck the body in any chance direction, the axis experiences both a twist and a sidewise push; and, if the axis is held in fixed bearings, they must be strong enough to resist these. The point where the line of percussion intersects the plane which passes through the axis of suspension and the centre of inertia is called the 'centre of percussion.' This point may be proved to lie on the 'axis of oscillation,' with reference to the given axis of suspension. If the body is hanging freely from a *point*, so that the centre of gravity lies vertically below it, the centre of percussion coincides with the centre of oscillation.

CENTRE OF PRESSURE. The centre of pressure of any surface immersed in a fluid is the point in which the resultant of the pressures of the fluid on the several points meets the surface. The pressure of a fluid at a point is the 'force per unit area' at that point, or the limiting value of the ratio of the force acting over a surface to the area of the surface, as the surface is taken smaller and smaller. This pressure is due to two things—the weight of the fluid and the reaction of the walls of the vessel which contains the fluid. (See HYDROSTATICS.) The pressure due to a gas is generally uniform over a surface, unless it is very large, and so the centre of pressure is the centre of gravity of the surface; but in liquids it is different. When the bottom of a vessel containing a liquid, or when a plane immersed in a liquid is horizontal, the pressures on all the points of it are the same; obviously they form a system of equal parallel forces, whose resultant will pass through the centre of gravity of the bottom or plane. But when the plane is inclined at an angle to the surface of the liquid, the pressure is not the same at all points, being greater at the lower than at the upper points. The resultant of the forces, then, will not pass through the centre of gravity of the surface, but through a point below it. This point is the centre of pressure. In the case of a vessel with a rectangle for one side, the centre of pressure is at the distance of one-third of the height from the bottom. In the general case it must be found by calculation involving the calculus.

CENTRE PINTLE CARRIAGE. A gun-carriage in which the chassis, or way on which the upper part of a coast gun moves, is attached to the pintle of the platform at its middle, and revolves around it through the entire circumference of the circle. The traverse circles are consequently continuous. By this arrangement a much greater horizontal field of fire is secured. See ORDNANCE; and COAST ARTILLERY.

CENTRIF'UGAL (Neo-Lat. *centrifugus*, from Lat. *centrum*, centre + *fugere*, to flee). A machine employed in the process of clarification and filtration. It consists of a circular vessel so constructed as to be capable of being made to revolve at a very high rate of speed. When the muddy liquid is placed in the vessel and the whole caused to revolve, it is found that the particles of dust, mud, or other matter fly to the circumference, leaving the liquid in the centre practically clear. By suitable arrangements the clear liquid can be drawn off. A machine of this kind is used in sugar-refining, and on a smaller scale in chemical laboratories.

CENTRIFUGAL and CENTRIP'ETAL (in botany). See INFLORESCENCE.

CENTRIFUGAL FORCE. See CENTRAL FORCES; and MECHANICS (section on *Dynamics*).

CENTRING (from *centre*, Fr. *centre*, from Lat. *centrum*, Gk. *κέντρον*, *kentron*, centre, from *κεντεῖν*, *kentein*, to prick). The framework upon which an arch or vault of stone, brick, or iron is supported during its construction. The simplest form of centring is that used by masons and bricklayers for the arches of windows and doors, which consist of boards cut to the required shape, upon the curved edge of which the bricks or stones of the arch are supported until they are keyed in. In building bridges or other structures where arches of great span are to be constructed, the centring is usually made of framed timbers, or timbers and iron combined. The arrangement of the timbers should be such that the strain upon each shall be mainly a thrust in the direction of its length, for if the strain were transverse, a comparatively slight force would snap or bend it, and if a longitudinal pull, the whole structure would be no stronger than the joints holding the pieces of timber together. In arches of great span, such as that of Waterloo Bridge, London, the Cabin John Bridge, Washington, or the Luxembourg Bridge (see BRIDGE), a longitudinal pulling strain is almost inevitable in some parts, as a beam of great length would bend to some extent under a thrusting strain. In such cases great skill and care are demanded in the designing and construction of the joints. As an arch is built from the piers toward the keystone, the weight upon the haunches during construction tends to push the crown upward, and therefore the problem of designing a framed centring involves the resistance of this tendency, as well as the supporting of the weight of the materials.

The centring of Waterloo Bridge, over the Thames at London, designed by Rennie, presents a fine example of the fulfillment of these requirements. The weight is resisted by direct thrust upon beams passing obliquely downward from various parts: one of each pair of these oblique beams thrusts outward, and is directly supported by the abutments; the other thrusts inward, toward a support equidistant from the abutments, the yielding of which is prevented by the longitudinal pull of lower and longer oblique beams. In this and other modern structures cast-iron shoes have been successfully used for the tying joints subject to the longitudinal pulling strain. The flexible centring, so called from its yielding at the joints, and varying its form with the load put upon it, is now abandoned. It was chiefly used by French engineers. That of Perronet for the bridge of Neuilly is a celebrated example. Occasionally, when a very great span is required, and the navigation will permit, piers are built or piles are driven to support the centring, and the design is much simplified thereby. Cupolas like the Pantheon and Saint Peter's in Rome, Saint Paul's in London, or the flat domes of the Turkish mosques, require very effective centrings. See BRIDGE-BUILDING; TUNNEL.

CENTRIP'ETAL FORCE. See CENTRAL FORCES.

CEN'TROSOME (from Gk. *κέντρον*, *kentron*, centre + *σῶμα*, *sôma*, body). The two polar centres of the spindle, or the two 'dynamic centres' from which the 'archoplasmic' threads radiate and toward which the halves of the split chromatin elements are drawn at the time of cell-division. During the resting stage of the cell only one centrosome is present. See CELL; EMBRYOLOGY.

CENTUM'VIRI (Lat. nom. pl., board of a hundred men, from *centum*, hundred + *vir*, man). In ancient Rome, a body of judges, three from each tribe, in charge of civil cases. Under the Empire the number was increased to 180, presided over by the *Decemviri Stlitibus Iudicandis*, and the sessions were held in the Basilica Julia, in the Forum. Here the younger Pliny pleaded, and the Emperor Trajan sometimes listened to the arguments.

CENTU'RION (Lat. *centurio*, from *centuria*, company of a hundred, from *centum*, hundred). In the Roman Army, the captain of a *centuria* or company. There were sixty centurions in each legion, a junior and a senior for each of the thirty *maniples;* and the senior of the first *maniple* of the first *cohort* was the chief centurion, or *primipilus*, of the legion, and often had the real command of the entire body.

CENTURIPE, chĕn'tōō-rē'pâ. A city in Sicily, 28 miles northwest of Catania, formerly called Centorbi (Map: Italy, J 10). It was destroyed in 1233 by Emperor Frederick II., and the inhabitants were transplanted to his new town, Agosta (q.v.), but it was rebuilt in 1548. Population, in 1881 (commune), 9000; in 1901, 11,311.

CENTURY PLANT. See AGAVE.

CENTURY WHITE. The nickname of John White (1590-1645), author of *First Century of Scandalous Malignant Priests.*

CEORL, kēôrl *or* chērl (AS., man, husband, Ger. *Kerl*, man, possibly ultimately connected with Skt. *jāra*, bridegroom, paramour), or CHURL. In the Anglo-Saxon social order, a common freeman, as distinguished from an eorl (earl), who was a privileged freeman. As the term *earl* did not originally imply a patent of nobility, nor even lordship or dominion, but only superior birth and social position; so the title *ceorl* implied no degradation or inferior status, but, on the contrary, marked its possessor off from the lower classes—the *laet*, or unfree man, and the *theow*, or slave. The ceorl was capable of owning land, and had a share in the common plowland and meadow-land of his community. The ceorls were the citizens of the *mark* (q.v.), or *hundred* (q.v.), composing the *moot* (q.v.), or general assembly of the people, and administering the local justice and government. See VILLEINAGE, and consult the authorities there referred to; also Freeman, *History of the Norman Conquest of England*, Vol. I. (2d ed., Oxford, Eng., 1870-76).

CE'OS. See ZEA.

CEPH'AË'LIS. See IPECACUANHA.

CEPH'ALAL'GIA. See HEADACHE.

CEPH'ALAS'PIS (Neo-Lat., from Gk. *κεφαλή*, *kephalē*, head + *ἀσπίς*, *aspis*, shield). A genus of primitive armored fossil fishes of the order Osteostraci, found in the brackish and fresh-water deposits of the British and North American Devonian formations. The body was elongated, triangular in section, and covered throughout with armor. The armor of the head region consists of a single heavy principal plate on the dorsal surface, which, when viewed from above, has the form of a horseshoe or the carapace of a king-crab (Limulus). A ventral plate is opposed to the dorsal plate and there are a few small accessory plates. There are no jaws, for the mouth was of the same form as that of the modern lamprey-eel, in which animal it is a sucking organ. Indeed, the lampreys are believed to be degenerate descendants from early heavily armored types like Cephalaspis and its associates among the Ostracodermi. The skeleton of Cephalaspis must have been wholly cartilaginous, for no traces of it have been preserved. The body was covered by bony scale-like rings, it had a single dorsal fin, and the tail-fin was heterocercal as in the modern sharks. The best examples of Cephalaspis have been obtained in the Old Red Sandstone of Scotland and England. The American examples are of less satisfactory preservation and are found in the Devonian sandstones of the provinces of New Brunswick and Quebec, Canada. For illustration, see OSTRACODERMI.

CEPHAL'IC INDEX. See INDEX, CEPHALIC, etc.

CEPH'ALIZA'TION (from Gk. *κεφαλή*, *kephalē*, head). The phenomena of progressive concentration and enlargement of the parts of the body belonging to the head; a phenomenon characteristic of segmented animals. Cephalization is only a special case of the law of division of labor. In the earlier metameric animals the head is only slightly different externally from the other segments, and consists of but two or three metameres. Already, however, the principal sense-organs are located in the head, and the central nervous system is enlarged there to form a brain. In the Arthropoda and the vertebrates the number of metameres in the head is increased, there being five head-metameres in the crayfish, probably five in insects, and from nine to thirteen in vertebrates. The head now takes on the principal sensory and psychical functions, which are abandoned by the rest of the body. The sense-organs become more and more concentrated at the head and they become larger: the nerve-centres at the head become relatively more important, and so the brain increases in size, while the interrelation of parts becomes more intimate, so that the head not only becomes larger, but also more of a unit, and the brain more efficient as a controlling factor.

CEPHALOCHORDA, sĕf'al-ô-kôr'dȧ (Neo-Lat. nom. pl., from Gk. κεφαλή, *kephalē*, head + χορδή, *chordē*, cord). A small class of chordate animals, including the lancelet. These are usually regarded as offshoots of the primary vertebrate type, although some maintain that they are pioneer or ancestral types themselves and foreshadow fishes. See AMPHIOXUS.

CEPH'ALODIS'CUS. An extraordinary deep-sea animal, regarded as allied to Balanoglossus (q.v.), and classed, with a related genus, Rhabdopleura, among the Adelochorda, as the lowest of the phylum Chordata. They were formerly regarded as polyzoans, but resemble Balanoglossus in structure, having a proboscis, a collar and collar-cavity, and a trunk, containing a structure resembling a notochord. "Cephalodiscus has an investment in the form of a branching gelatinous structure, which is beset with numerous short, filiform processes, and contains a number of cavities occupied by zooids. The latter are not in organic continuity, so that, though inclosed in a common investment, they do not form a colony in the sense in which the word is used of the Polyzoa or hydroid polyps. . . . They multiply by buds, but these become detached before they are mature. . . . Rhabdopleura occurs in colonies of zooids organically connected together, and inclosed in, though not in organic continuity with, a system of branching membranous tubes." Consult Parker and Haswell, *Text-Book of Zoölogy* (London and New York, 1897).

CEPH'ALO'NIA, or **KEPH'ALLE'NIA** (Gk. Κεφαλληνία, from κεφαλή, *kephalē*, head + ὄνος, *onos*, donkey). The largest of the Ionian Islands (q.v.), situated off the coast of Greece, between latitudes 38° and 38° 30′ N. and longitudes 20° 21′ and 20° 49′ E. (Map: Greece, B 3). Its greatest length is about 32 miles, and its total area 302 square miles. The surface is mountainous, rising near the centre to an altitude of 3714 feet. The soil is for the most part thin, and water scarce and the rainfall slight. The climate is warm and dry, but agreeable. Earthquakes are not infrequent. The inhabitants are industrious and enterprising, and have planted vineyards wherever the grape will grow. There is little available land for the cultivation of grain, but the output of fruit is considerable. The chief products are olives, currants, and other southern fruits and vegetables, wine, and oil. The population in 1899 was 80,178. The language spoken is a Greek dialect. The chief towns are Argostoli (q.v.), the capital, and Lixuri, on the Bay of Livada, on the southwest coast.

Cephalonia is called, by Homer, Same or Samos. Later the island appears under the name of Cephallenia, derived from its inhabitants. It successively fell into the hands of the Athenians, Romans, Byzantines, Normans, and Venetians, from the last of whom it was repeatedly wrested by the Turks. On the fall of the Venetian Republic, in 1797, it was seized by the French, who were in their turn dislodged by the Russians. In 1809 it came into the possession of England. It was ceded to Greece in 1864. With Ithaca and some neighboring islets Cephalonia now forms a nomarchy of that kingdom.

CEPH'ALOP'ODA (Neo-Lat. nom. pl., from Gk. κεφαλή, *kephalē*, head + ποῦς, *pous*, foot). The highest and most specialized class of Mollusca, characterized by the presence of a circlet of fleshy arms surrounding the mouth on the front of the head. These arms, also called 'tentacles' and 'feet,' are modifications of the 'foot' which, as the muscular organ of locomotion of the Gastropoda and the Pelecypoda, occupies a ventral position on the body of the animal in those classes. In the Cephalopoda the foot has moved forward and become divided into two sections. The anterior section forms the circlet of arms that serve both as accessory mouth-parts, to catch and hold the prey, and as organs of creeping locomotion. The posterior section has become developed into part of a most efficient hydrostatic organ of propulsion, called the 'hyponome' or 'siphon.' The body of the cephalopod is essentially a bag formed of the 'mantle,' which entirely incloses the visceral organs, and which is open only at the end to which the head is attached. In some genera this bag is almost spherical, and creeping locomotion is accomplished chiefly by the appendages of the head: in others, the body is elongated, and furnished with two fin-like expansions on the sides, and the animal propels itself through the water by means of the hydrostatic organ, the hyponome. The ordinary position of the cephalopod in water is quite different from that of any other mollusk. A chiton, a snail, or a clam moves with the foot down, the mouth at the anterior end, and the visceral hump uppermost on the dorsal surface. A cephalopod when creeping has a very similar position, except that the mouth is ventral. In swimming, however, cephalopods have the mouth at the anterior end, and what was the anterior side is now the dorsal side of the animal. Thus the cephalopod, in taking to an active swimming life, has tipped backward through an angle of 90°. Cephalopods are able to swim forward or backward, often with great rapidity, the most important means of locomotion being the hyponome, near the under side of the head. The mantle is attached to the neck only on the dorsal side; elsewhere there is free communication between the mantle-cavity and the outside. When the mantle relaxes, water fills the cavity; when it contracts it closes tight about the neck; there is no exit for the contained water save through the hyponome, and, as contraction takes place suddenly and forcibly, a jet of water is expelled from the hyponome, causing the animal to dart backward through the water.

The head of a cephalopod is roundish, more distinct from the rest of the body than it is in other mollusks, and is generally furnished with two large and prominent eyes that are very similar in structure to those of vertebrate animals. The nervous system is very well developed, and is more centralized than in other mollusks. The ganglia are well concentrated in what may be called the brain, which lies above and around the œsophagus, and is more or less wholly included within the cartilage of the head. From this brain nerves go to the various organs and parts of the body. The senses of hearing and smell are regarded as weak, but that of taste seems to be strong. The mouth opens in the midst of the circlet of arms. It is furnished with a strong, horny beak of two jaws that move vertically like those of a parrot, but the upper jaw is the shorter of the two. In addition to the jaws, there is a lingual ribbon covered with minute teeth, like that of the odontophore of the gastropods. The digestive apparatus is very complicated. The gullet swells out into a crop, and there is a gizzard as muscular as that of a bird. The intestine, after a few convolutions, terminates in the cavity which contains the gills at the base of the hyponome, by which the water is ejected from the mantle-cavity after having supplied air for respiration. There are two gills in most living cephalopods, one on each side, lying close to the body-wall; the only exceptions to this rule are in the three species of nautilus which have four gills, a pair on each side. Each gill consists of many membranous plates fixed to two sides of a stalk. The heart in the Tetrabranchiata consists of a single ventricle only; but there are four auricles, one for each gill; the Dibranchiata have two auricles, one for each gill. In the latter group, moreover, are found two contractile reservoirs (branchial or respiratory hearts), one for each gill, by which the blood is pumped into these organs.

The arms or feet are very numerous in the Tetrabranchiata, and are not provided with suckers, but are hollow and furnished with long, retractile tentacles. In the Dibranchiata the arms are either eight or ten in number, are furnished with suckers (acetabula), and in the ten-armed genera two of the arms are much longer than the others and differ from them in form. The suckers are muscular disks, with cartilaginous rims, capable of exact application to any object, with central cavities the bottoms of which can be retracted at will to form a vacuum, and thus render the adhesion of the sucker close and firm after the manner of a cupping-glass. The poulpe or octopus has each of its eight flexible arms crowded with 120 pairs of such suckers, and as animals of this kind, with arms several feet long, exist commonly in the tropics, they are considered dangerous neighbors. Still more formidable, however, are the hook-squids of the south seas, the two long arms of which have suckers furnished in the centres with hooks that enter the flesh of any creature upon which the squid may lay hold.

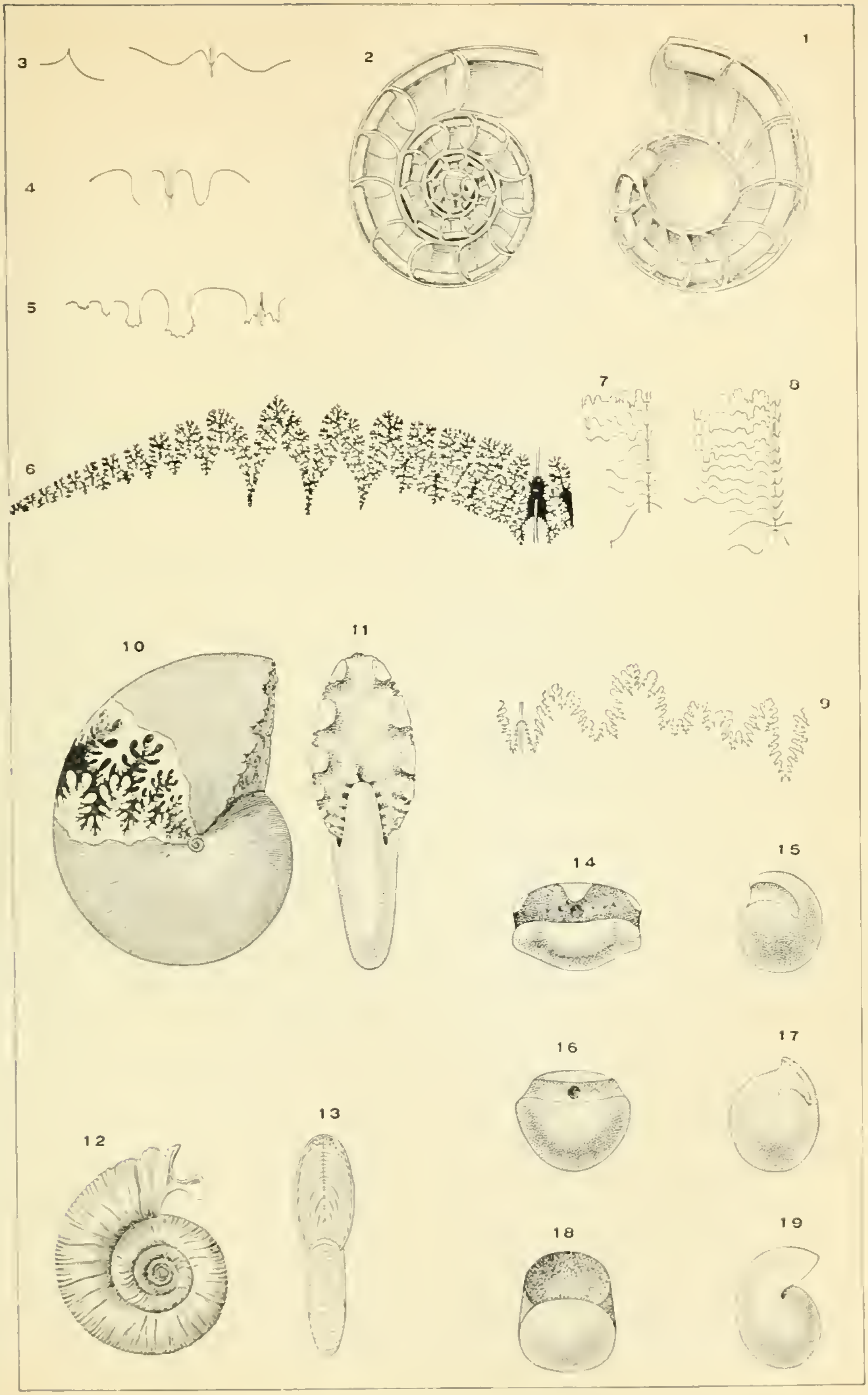
The sexes are distinct in all cephalopods. In most cases the male is smaller than the female. He differs, moreover, in the asymmetry of his arms, one of which is more or less modified to form a copulatory organ. In two or three genera this modified arm breaks off from the body during copulation, and finds its way into the mantle-cavity of the female, where it empties itself of the male sperm-cells which it carries. The first zoölogist who found such an arm in the mantle-cavity of a female argonaut (q.v.) mistook it for a parasitic worm and called it 'hectocotylus' (hundred cups), from the numerous suckers which it bears. When its true nature was discovered, it was called a 'hectocotilized' arm, and the term is still used in that connection. The eggs have a horny covering, and after their extrusion from the parent they become agglutinated into masses of various forms. The young from the first very much resemble the mature animals, except in size.

All dibranchiates are provided with a peculiar organ of defense, called an 'ink-bag,' which is absent in the tetrabranchiates. This ink-bag is filled with a peculiar secretion, capable of being expelled at will through the hyponome to darken the surrounding water and thus facilitate the escape of the cephalopod. (See SEPIA.) The tetrabranchiate cephalopods have a chambered shell which is described in further detail below. (See also NAUTILUS.) The dibranchiates have no true external shells—the shell of the female argonaut (q.v.) being scarcely an exception—but they have an internal shell, homologous to the external tetrabranchiate shell, known as cuttlefish-bone, etc., sometimes merely rudimentary, included between the folds of the mantle and apparently serving to support the organs and to give rigidity to the body while swimming.

The cephalopods are all very voracious; they are carnivorous, feeding on fish, mollusks, crustaceans, etc. Even a powerful crab is not safe from the attack of a dibranchiate cephalopod little bigger than itself; the arms of the octopus, so abundantly provided with suckers, seize the crab, trammel every movement, and the parrot-like beak is strong enough to break the hard shell. Cephalopods are all marine, and they are found in the temperate and tropical parts of all seas. Nautilus, the single modern genus of the tetrabranchiates, with three species, lives in the Indian and South Pacific oceans, where it creeps on the bottom, near the shore, in comparatively shallow water. The dibranchiates are quite abundantly represented at the present time. The members of the two living orders, Sepioidea and Octopoda, have rather different habits and correspondingly different habitats. The Octopoda, with round, sac-like bodies and eight arms, are essentially creepers on the bottom, like the poulpe or octopus. They live in shallow water along the shore, hiding in cavities during the day and creeping about over the rocks of the bottom by night. They are also capable, when they find themselves in large bodies of water, of swimming rapidly by means of the hyponome. They are often handsomely colored creatures, but they are generally repulsive objects.

The Decapoda have long, slender bodies and ten arms, of which two are much longer than the rest. They are found in all seas, often in deep water. Many of them congregate in hordes in the open sea, swimming about with great rapidity. Unlike the octopods, they seldom creep on the bottom, the hyponome being the principal organ of locomotion. Their motions are extremely graceful, and they are often beautifully colored. In size the living cephalopods range from a few inches in length (Sepiola) to many feet. The largest invertebrate is undoubtedly a giant squid (Architeuthis) of the Newfoundland

CEPHALOPODS



For names and description, see text.

banks, that often attains a length over all of 50 feet, of which the body has a length of 9 feet, with a thickness of 6 feet, and the arms the enormous length of 40 feet. This creature is indeed the 'devil-fish' about which so many thrilling stories have been told.

Fossil Cephalopoda. The shells of cephalopods are more or less common in the rocks of all ages, from the top of the Cambrian to the top of the Mesozoic, while in the Tertiary deposits they are less frequently met with. In some formations they are so abundant as to constitute the greater part of the mass. They are objects of much interest to the geologist, in that they furnish excellent 'index fossils' for the identification of the formations, as in the case of the Triassic and Jurassic rocks of Europe, which are subdivided into a great number of zones, according to the particular species of Ammonoidea that they contain. To the paleontologist they are also of very great interest, because, better than any other class of animals, they afford opportunity for studying the mode of evolution of races of animals, and illustrations of the various laws of bioplastology, such as Agassiz's law of recapitulation or palingenesis, the inheritance of acquired characters, the laws of acceleration, etc. For some of the interesting and important results derived from the study of the fossil shells of tetrabranchiate cephalopods, the reader should consult the papers of Hyatt, Buckman, Foord, and others, which are cited at the end of this article. The philosophic bearings of the study of cephalopods can be dwelt upon only lightly in this article, as lack of space prevents a proper array of facts necessary for their elucidation.

The cephalopods were very important members of the faunas that inhabited the early seas of our globe, and were then far more abundant than they are now. The tetrabranchiates are represented by at least 7500 fossil species, of which number 5000 are members of the totally extinct order Ammonoidea, which began in the Silurian and culminated in the Cretaceous time. The remaining 2500 are Nautiloidea, which appeared in the late Cambrian time, and which have continued to the present day, though they enjoyed their climax during the early Paleozoic ages of the Ordovician and Silurian. The dibranchiates are far less important as fossils. They appeared in the early Mesozoic, where they were represented by numerous Belemnitoidea, which declined with the close of Cretaceous time, and they have continued to the present era, when they are represented by some 200 known species of the Sepioidea and Octopoda.

The study of fossil cephalopods is based almost entirely on the shell characters, for traces of the soft parts are only seldom found. The fossil ink-bags, jaws, and hooks of certain dibranchiates are rare exceptions. (See Squid; Sepia.) As already indicated, cephalopods are divided, according to their gill-structure, into two subclasses — Tetrabranchiata and Dibranchiata — which groups differ also in respect of their shell characters. The shell of the tetrabranch is built on the plan of that of the nautilus, though, instead of being closely coiled, it may be loosely coiled (Gyroceras), curved (Cyrtoceras), or straight (Orthoceras). In the dibranchiates the shell is internal, and has the form of a pen or cuttlefish-bone; or, in those early Mesozoic genera that show close relations to the tetrabranchs from which they have been recently evolved, the shape of a solid, limy, cigar-formed guard, into the larger end of which is inserted a chambered conical shell that resembles Orthoceras. (See Belemnites.) One modern dibranchiate (Spirula) has an internal shell remarkably like that of certain loosely coiled nautiloids of the Devonian.

The type of tetrabranchiate shell is found in the nautilus. Here the shell is coiled so closely that the outer whorls to a considerable extent envelop or clasp the inner turns. In section, a nautilus-shell is seen to be essentially a coiled, elongated cone with quite regular transverse walls or 'septa' dividing the internal cavity into a number of chambers or 'cameræ,' of which the largest is the outermost or living-chamber occupied by the animal. Extending from the living-chamber through all the posterior chambers to the apex of the shell, and piercing each septum, is a slender tube, the 'siphuncle,' which occupies a position near the centre of the cone, and which serves to maintain communication between the living-chamber and the posterior regions of the shell. Each of the septa represents a stage in the development of the individual, so that in each nautilus-shell we have all the stages through which the shell has passed from the embryonic period, represented by the minute apex in the centre of the coil, to the adult or senile stage, represented by the living-chamber on the outside of the coil. It will be readily recognized that this condition is of utmost value for the study of the evolution of the group, and that it is scarcely equaled in any other class of animals. For this reason the cephalopods have furnished greater contributions to the knowledge of bioplastology than have any other organisms.

At the apex of the nautilus-shell is seen a scar that marks the place of attachment of a deciduous embryonic shell or 'protoconch,' which probably fell off as soon as the true shell began to develop. The developmental stages of the living nautilus are less well known than are those of most of its extinct ancestors, but the existence of the deciduous embryonic sac is inferred from the presence of a thin-walled calcareous bulb on the apices of several Paleozoic relatives of Nautilus, and also in its descendants, the goniatitoids and ammonoids. The septa are united to the side walls of the cone along lines that show prominently in the fossil forms, which are nearly always filled solid with infiltrated calcite. These are the suture-lines, which furnish characters of the greatest importance in determining the relationships, especially of the species of Ammonoidea. The lines of growth on the outside of the shell indicate the form of the margin of the aperture, and vary with the habits of the animal. In living Nautilus the hyponome is near the outer ventral curve of the aperture of the shell, and there is on that side an emargination or sinus known as the 'hyponomic sinus.' The size of this sinus corresponds to the swimming activity of the animal; the larger the sinus the more active the swimmer, and vice versa. The aperture of Nautilus is open wide, and the animal is considered to be a good crawler. In some of the Paleozoic nautiloids the aperture is much restricted, and the ability to crawl must have been greatly diminished, while the swimming power was increased, as evidenced by the somewhat larger size of the hyponomic sinus.

The degree of curvature of the shell is important. The earliest relatives of Nautilus were straight shells that had all the morphic characters of Nautilus itself; soon curved and coiled forms appeared, and the coiled forms were in all cases evolved from straight forms through intermediate curved forms. Accompanying the changes in curvature were also changes in the form and position of the siphuncle. (See ORTHOCERAS; CYRTOCERAS; NAUTILUS.) The coiled forms, such as Nautilus, etc., appeared in considerable numbers at a very early age in the Lower Ordovician period, and certain nautiliconic genera continued, often in abundance, in the late Paleozoic and Mesozoic periods, to the present time, Nautilus itself maintaining its early form without change. The straight cones (Orthoceras and its allies) began at an even earlier age in the Upper Cambrian. They reached a great expansion during the Ordovician and Silurian periods, when they gave rise to many peculiar genera, such as Conoceras, Piloceras, Ascoceras, Sphyradoceras, Endoceras, and Lituites; they declined through the Devonian and Carboniferous periods, and became extinct in the Triassic.

Various stocks of straight shells, in assuming the habits of both crawlers and swimmers, assumed curved forms and gave rise to such genera as Cyrtoceras, Phragmoceras, Gomphoceras, etc., at various periods in the history of each stock. The shells of some of these curved forms, through adaptation to a crawling life on the ocean bottom, became more closely coiled, their organization changed, and a new order (the Ammonoidea) arose, which outnumbered its ancestors, the Nautiloidea, enjoyed a pyrotechnic expansion during the early Mesozoic period, soon began to decline, and eventually, at the end of the Cretaceous, became suddenly totally extinct.

The ammonoidean shells differ from the nautiloidean in that they always have a calcareous protoconch of sac-like form attached to the apex of the cone. On this protoconch is formed the early ammonoid shell with the septa of simple curves like those of the nautiloids. After a few chambers have been formed the septa become crimped or wrinkled, and the sutures wavy or with prominent curves. In the earliest Devonian members of the group, the goniatitoids, these simply curved or undulating sutures are the rule in adult shells. Later members of the Mesozoic Age show sutures of great complexity. It is in these later forms—the ceratitoids and ammonitoids—that the illustrations of Agassiz's law of recapitulation are observed. If an adult ammonite shell, such as Tropites, be broken and the fragments be arranged in order from apex to living-chamber, the sutures will be found to increase in complexity from simple curves to complex wavy lines. The simple suture will recall that of the Silurian nautilus, the wavy suture that of the Devonian goniatite, and the complex suture is that of the normal ammonoid. Together with the change in the form of the suture-lines, there is a change in the position of the siphuncle. This is illustrated in the sections of Paltopleuroceras and Parkinsonia (Cephalopoda, Plate I., Figs. 1 and 2), where in the first chamber the siphuncle is central, as in Nautilus, and in successive chambers approaches nearer to the outer ventral wall of the shell, with which it finally unites. We have here instances where the shell passes in its development from embryo to adult through stages that recall the forms of its past ancestors. Some of the more complex types of ammonitoid sutures are shown in figures 6, 9, and 10 of Plate I., where also the illustrations of Phylloceras (Figs. 10 and 11) show the relations between the crimping of the septum and the complexity of the suture-line.

The embryos of ammonoids (Plate I., Figs. 14 to 19) exhibit three types distinguished as asellate, latisellate, and angustisellate, which terms refer to the form of the first suture-line. As a rule the asellate protoconchs are the more primitive, as in the early goniatitoids. The later goniatitoids have latisellate embryos. The angustisellate embryos appear in the Triassic genera of ceratitoids, and nearly all of the ammonitoids of the Jurassic and Cretaceous have angustisellate protoconchs. Many ammonoids are known to have possessed opercular plates that served to close the aperture of the shell after the retreat of the animal, as shown in the illustration of Oppelia (Plate I., Fig. 13). This organ is known as the anaptychus when single, and aptychus when double, and examples of it were in early days supposed to be the carapaces of phyllopod crustaceans.

In form, the ammonoids vary from globular shells (Cyclolobus, Plate II., Fig. 4) to flattened discoids (Pinacoceras, Plate II., Figs. 10 and 11), and their surfaces are variously ornamented, from smooth Gephyroceras (Plate II., Fig. 16), costate Dipoloceras (Plate II., Fig. 6), to nodose Trachyceras (Plate II., Fig. 9), and in the phylogerontic (senile) stages of some races short spines are developed (Ancyloceras, Plate II., Fig. 17). The normal ammonoid shell is a flat, closely wound coil, but the latest members of several races in the Cretaceous rocks have the shell uncoiled or straight in the adult stages, though closely coiled in the early stages of their growth. In some the uncoiling begins only in old age (Scaphites, Plate II., Fig. 5, and Macroscaphites, Plate II., Fig. 3); in others it is accelerated and appears at relatively earlier periods in the development, as in Baculites (Plate II., Fig. 7), Spiroceras (Plate II., Fig. 1), Hamites (Plate II., Fig. 2), and Ancyloceras (Plate II., Fig. 17). The uncoiling sometimes produces a turreted shell, as in Turrilites (Plate II., Fig. 15). These uncoiled shells of the Cretaceous rocks are degenerate descendants from earlier normal Cretaceous or Jurassic ancestors, as can be demonstrated by the forms of their sutures. The degeneracy is exhibited also in the form of the sutures, which have become more simple, and in the shape of the cone, which has lost its flattened section due to the closely coiled condition, and assumed the rounded, cylindrical section of its earliest ancestors of the Paleozoic, though it retains the 'impressed zone' to serve as evidence of its relationship. For notes on the fossil forms of dibranchiates, see articles referred to at end of the bibliography.

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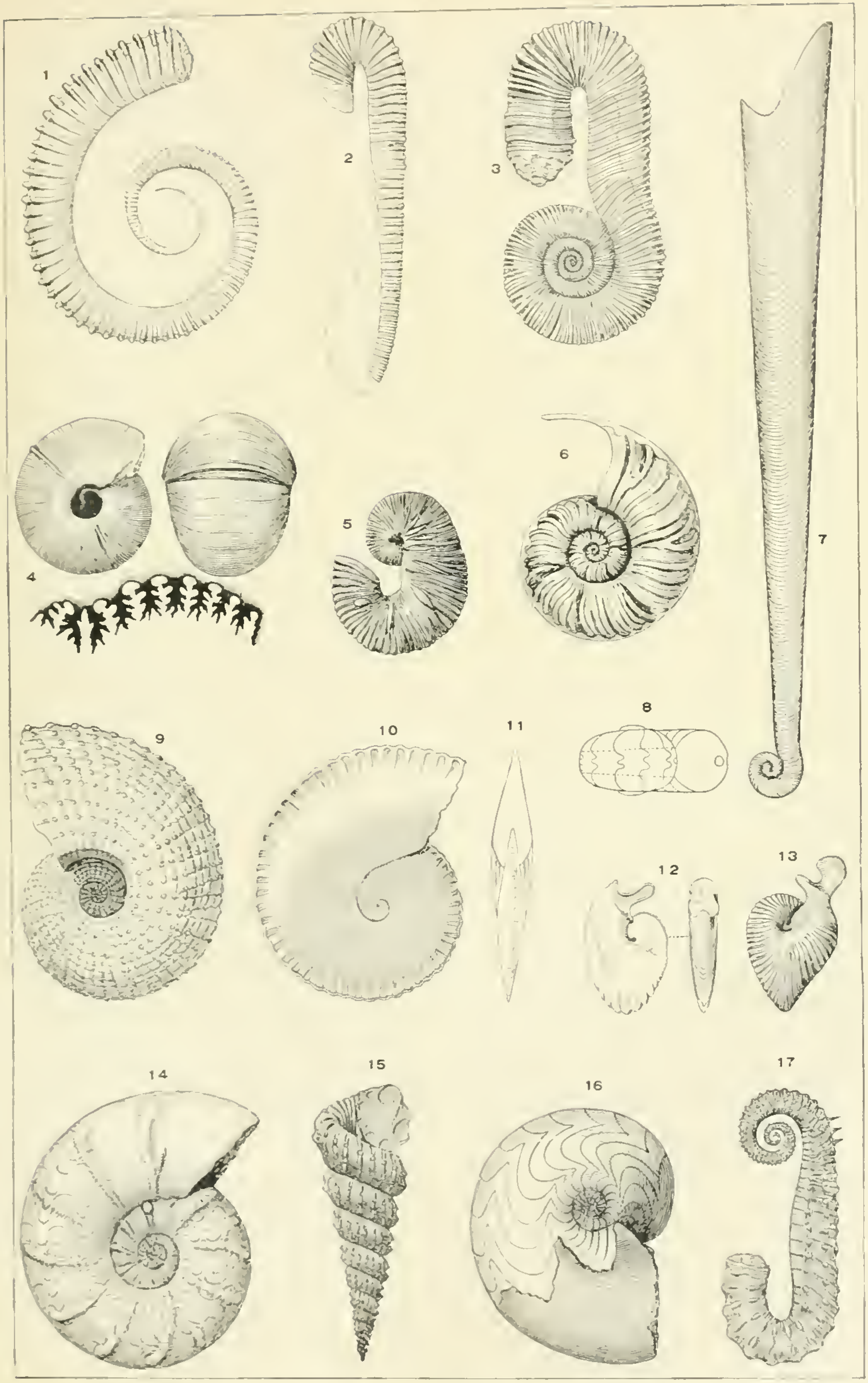
CEPHALOPODS



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CEPHALUS. A grandson of Æolus, and the husband of Procris, whom he inadvertently killed while she was spying upon him in suspicion of his fidelity. After undergoing punishment for his unintentional crime, he settled in an island which was called, after him, Cephallenia.

CEPHEUS, sē′phē-ŭs *or* sē′fūs (Lat., from Gk. Κηφεύς, *Kēpheus*, in Greek mythology a king of Ethiopia who was husband of Cassiope, father of Andromeda, and father-in-law of Perseus). A constellation of the Northern Hemisphere. Its principal star, Alderamin, is of the third magnitude.

CEPH′ISOD′OTUS (Lat., from Gk. Κηφισόδοτος, *Kēphisodotos*). The name of two Greek sculptors, who worked during the Fourth Century B.C. The younger was the son of the famous Praxiteles (q.v.), and of his works only scanty mention has been preserved. He and his brother Timarchos made a statue of Menander (q.v.), which was set up in the theatre at Athens, and of which the base has been found bearing the signature of the artists. The elder Cephisodotus seems to have been the elder brother, or possibly the father, of Praxiteles, and his works mark the transition from the art of the Fifth Century to that of the Fourth. His group of Irene (Peace) and the infant Plutus (Wealth) is probably reproduced in the so-called Leucothea in Munich. The allegorical subject is in keeping with the later tendencies, but the style shows close dependence upon the art of Phidias. The date of Cephisodotus is determined largely by this statue, as it was set up in Athens after the battle of Naxos in B.C. 376, and probably in celebration of the peace of B.C. 371. The group of Zeus, Artemis, and Megalopolis in the city of Megalopolis was certainly erected after B.C. 370, but the remains of the building seem to point to a much later date, and it is probable that the artist was the younger Cephisodotus.

CEPHIS′SUS (Lat., from Gk. Κηφισσός, *Kēphissos*). One of the two principal rivers of Attica, flowing into the Saronic Gulf between Athens and the Piræus. Nearly all the rivers of Greece are small rapid torrents—entirely dry, or a mere chain of pools during the summer months; but the Cephissus has a constant supply of water from the springs on the side of Mount Parnes and Mount Pentelicus. The greater part of its water, however, is diverted into artificial channels for purposes of irrigation, and the exact course of the ancient bed can no longer be ascertained. The principal river of western Bœotia has the same name.

CERACCHI, chȧ-rä′kē, GIUSEPPE (c.1760-1802). An Italian sculptor. He was born in Corsica, and early moved to Rome, where he acquired considerable reputation. In 1772 he went to England, where he was on terms of friendship with Sir Joshua Reynolds, whose bust he modeled. He afterwards came to America, and made busts of Washington (in the Boston Athenæum), Hamilton, and other statesmen. Returning to Italy in 1796, he made a bust of Napoleon, who was then at Milan. Three years later he joined some artists in Paris in an attempt to regenerate the Republic. He formed a plot with Aréna, Topino, Lebrun, and others to assassinate the First Consul. One of the conspirators revealed the plot to Fouché, and Ceracchi and all his fellow conspirators but one were executed.

CERAM, or **ZERAM**, *Port. pron.* se-räN′. The largest island of the Moluccas (q.v.). Dutch East Indies, situated between longitudes 127° 55′ and 130° 50′ E., and latitudes 2° 45′ and 3° 40′ S. It has a length of 185 miles and a breadth of 30 miles (Map: East Indies, H 5). Including a few adjacent small islands, it occupies an area of over 6900 square miles. The surface is mountainous, a range of volcanic origin traversing its length, and reaching in its highest elevation an altitude of about 9800 feet. The interior is covered with thick forests of cocoa and sago palms. The cultivated portion on the coast is very productive, yielding rice, tobacco, and cacao. The population is estimated at 100,000 to 200,000, chiefly Alfurus, who, in spite of the dominion of the Dutch, have still retained their original customs and mode of life.

CERAMBYCIDÆ, sĕr′ăm-bĭs′ĭ-dē (Neo-Lat. nom. pl., from Gk. κεράμβυξ, *kerambyx*, horned beetle). A prominent family of cryptopentamerous beetles, commonly known as longhorns, and including about 13,000 described species, of which 600 belong in the United States. A few find nourishment in herbaceous plants, but in most the soft, white grubs, with powerful mandibles, and sometimes legless, live concealed in burrows in wood, feeding upon it, and there passing the pupal stage also. The life of these beetles may be very long. They have been found still inhabiting the wood of furniture several years in use, and, according to Sereno Watson, may live forty-five years; but it is not certain whether this prolongation of life takes place in the pupal or larval stage — probably the latter, as larvæ entombed in dried wood are so poorly nourished that they must reach maturity slowly. Several kinds of these beetles produce sound by stridulation, and some even possess two sets of stridulating organs. Several species greatly resemble Hymenoptera in appearance and behavior.

The family is subdivided into three subfamilies — the Prioninæ, Cerambycinæ, and Lamiinæ. The Prioninæ are the largest of the longhorns and have a thin, toothed margin on the thorax; the grubs infest the roots of the grape, apple, pear, poplar, pine, and other trees. Of the typical Cerambycinæ, 400 species occur in the United States, and adults may be found frequently on the goldenrod, feeding on the pollen. The locust-borer (*Cyllene robiniæ*) and the oak-pruner (*Elaphidion villosum*), elsewhere described, are examples. Of the Lamiinæ, one form, the 'sawyer,' does much harm to pine-trees; another destructive genus is Saperda, injurious to apples, raspberries, etc. The various bright-red beetles on milkweed also belong to this subfamily. For a synopsis of the classification and descriptive tables of genera, etc., consult Leng, *Bulletin Brooklyn Entomological Society*, Vol. VII. (Brooklyn, 1884), continued in *Entomologica Americana*, Vols. I.-IV. (Brooklyn, 1885-89).

CERAMIC (Fr. *céramique*, from Gk. κεραμικός, *keramikos*, ceramic, from κέραμος, *keramos*, potter's clay). A term used to designate the department of plastic art which comprises all objects made of clay, including terra-cotta, porcelain, and all other forms of pottery (q.v.).

CER'AMI'CUS (Lat., from Gk. Κεραμεικός, *Kerameikos*, from κεραμεύς, *kerameus*, potter, from κέραμος, *keramos*, potter's clay). The potters' quarter at Athens, which was divided into the Outer and Inner Ceramicus. In the Outer Ceramicus were buried those who had fallen in battle, and hence were honored by the State with a public funeral and a monument. For an account of this ceremony, consult *Thucydides*, Bk. II., trans. by Jowett (London, 1881).

CERAR'GYRITE (from Gk. κέρας, *keras*, horn + ἀργυρίτης, *argyritēs*, made of silver, from ἄργυρος, *argyros*, silver). A valuable ore of silver (AgCl) that crystallizes in the isometric system, and in color is light gray to light green. It is found largely in Peru, Chile, and Mexico, where the mineral occurs of a greenish color with native silver; also in the Ural Mountains, and in Norway. In the United States it occurs in various localities in Colorado, Nevada, and Utah. This mineral is usually found in veins of clay slate, accompanied with other ores of silver, and chiefly in the higher parts of such veins.

CERAS'TES (Lat., Gk. κεράστης, *kerastēs*, horned snake, from κέρας, *keras*, horn). A genus of viperine serpents of northern Africa and Arabia, characterized especially by "the presence in the male, and sometimes in the female, of a pair of scale-covered, horn-like processes above the eyes." There are two species, called horned vipers. See VIPER.

CERAS'TIUM. See CHICKWEED.

CE'RATE (Lat. *ceratum*, wax plaster, from *ceratus*, p.p. of *cerare*, to wax, from *cera*, wax). A compound of wax with oily and medicinal substances in such proportions as to have the consistency of an unguent (q.v.). Cerates are intermediate between ointments and plasters, and their consistency should be such that when spread upon leather or cloth at ordinary temperatures and applied to the skin they will not be melted by its heat.

CERAT'IOCAR'IDÆ (Neo-Lat. nom. pl., from Gk. κεράτιον, *keration*, dim. of κέρας, *keras*, horn + καρίς, *karis*, shrimp). A family of interesting Paleozoic crustacea, of the order Phyllocarida, members of a group of synthetic forms that are intermediate between the Phyllopoda on one hand and the Malacostraca on the other. See CRUSTACEA; PHYLLOCARIDA.

CERATITES, sĕr'ȧ-tī'tēz (Neo-Lat. nom. pl., from Gk. κέρας, *keras*, horn). A genus of discoid ammonoidean cephalopod shells, found as fossils in the Triassic rocks of Europe and America. The principal points of distinction are afforded by the broad low saddles and the short narrow simple lobes of the suture-line. The form of the suture-line of this genus is often used as typical of one of the stages through which the sutures of the higher Ammonoidea pass in their evolution from the simple curve of the early nautiloids to the complex sutures of the later ammonoids. See CEPHALOPODA; AMMONITES.

CER'ATO'DUS (Neo-Lat., from Gk. κέρας, *keras*, horn + ὀδούς, *odous*, tooth). A fish. See BARRAMUNDA.

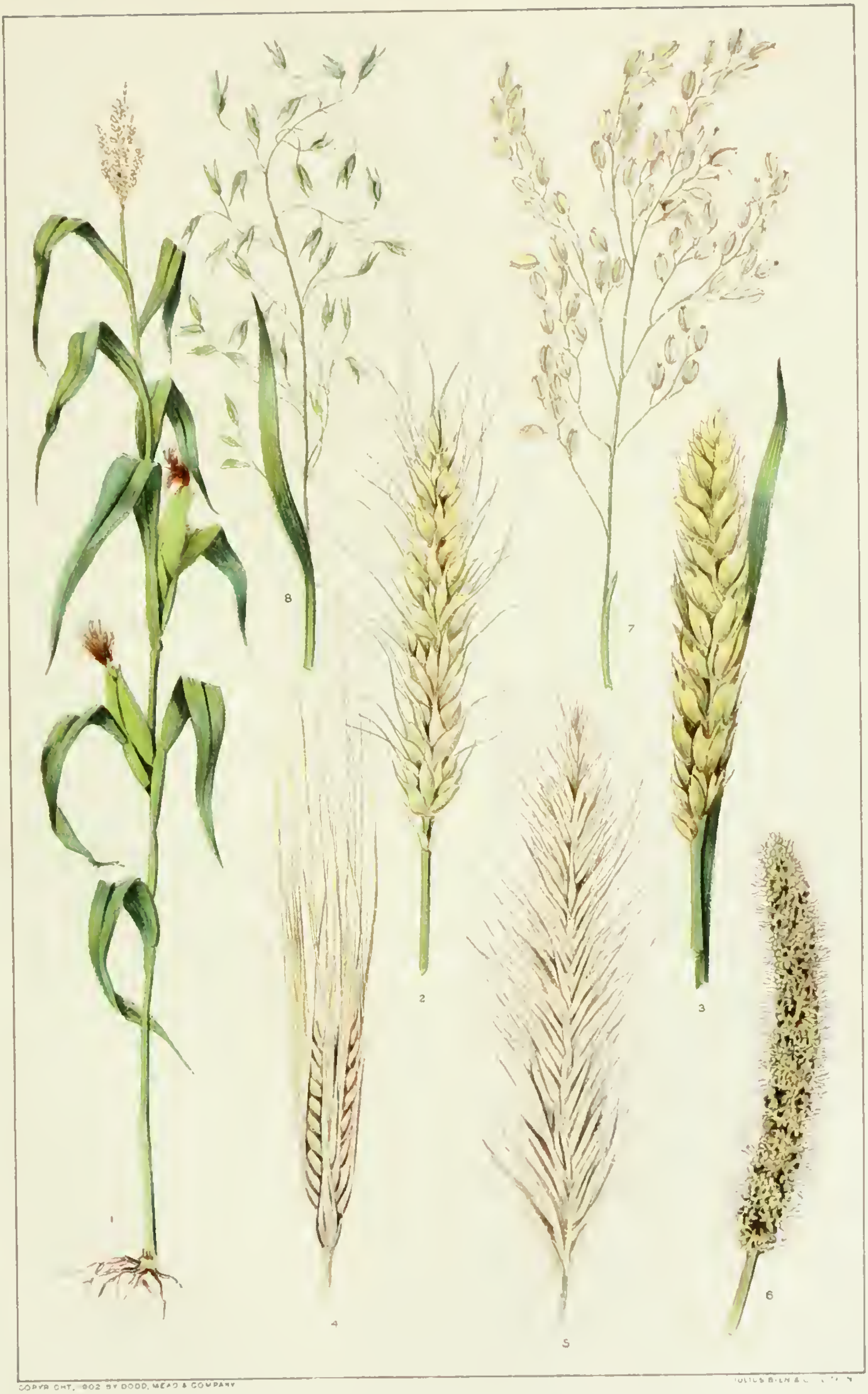
CER'ATO'NIA. See CAROB.

CER'ATO'SA (Neo-Lat. nom. pl., from Gk. κέρας, *keras*, horn). An order or group of sponges, in which the skeleton consists of elastic fibres of a horny substance (spongin). The toilet sponges are examples. See SPONGE.

CER'ATOSAU'RUS (Neo-Lat., from Gk. κέρας, *keras*, horn + σαῦρος, *sauros*, lizard). A carnivorous dinosaur from the upper Jurassic deposits of Colorado, distinguished from all other dinosaurs by the horn on the front of its skull. The animal was about 18 or 20 feet long with the hinder part of the trunk, and also the tail, heavily built. Its head was rather large, and besides the single horn on the nose there was a prominent bony ridge in front of each eye. The teeth were numerous and well fitted for cutting and chewing flesh. The neck was short and thick. The fore limbs were remarkably small and were probably of no aid in locomotion, though the beast may have used them for holding food while eating. In contrast with the tiny fore limbs, the hind limbs were large and powerful, and were armed with sharp retractile claws. The feet were digitigrade, that is they rested on the ends of the fingers instead of on the palms. The pelvic bones are peculiar in that they are ankylosed or joined together by the soldering of the joints. The pubes are long and are united at their ends to form a solid, massive piece, which probably served as an accessory support for the animal while resting. Another point of peculiarity is the form of the vertebral centra, which are flat on their anterior and concave on their posterior faces. Only a single species, *Ceratosaurus nasicornis*, is known to belong to this genus. See DINOSAURIA.

CERAU'NIAN MOUNTAINS (Gk. τὰ Κεραύνια ὄρη, *ta Keraunia horē*, from κεραυνός, *keraunos*, thunder, from their frequent storms).

CEREALS



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1 CORN - ZEA MAYS
2 BEARDED WHEAT - TRITICUM VULGARE
3 BEARDLESS WHEAT - TRITICUM VULGARE
4 BARLEY - HORDEUM VULGARE
5 RYE - SECALE CEREALE
6 MILLET - PANICUM MILIACEUM
7 RICE - ORYZA SATIVA
8 OATS - AVENA SATIVA

The ancient name of two mountain ranges. (1) A ridge of mountains in the northwest corner of Epirus, projecting into the Adriatic Sea, otherwise called Acroceraunian, now known as Khimara. (2) The southeastern extremity of the Caucasus range. There was also a mountain in Libya called Ceraunian.

CER′BERUS (Lat., from Gk. Κέρβερος, *Kerberos*, perhaps connected with Skt. *śarvara*, speckled). In Greek mythology, the name of the dog—the offspring (according to Hesiod) of Typhon and Echidna—who guarded the portal of the infernal regions. Cerberus appears in early literature and art in connection with the twelfth labor of Hercules (q.v.), by whom he was brought from the lower world. Later he becomes the guardian of the portal, and fawns on the arriving souls, but prevents any attempt at escape. In the poets, Cerberus is described as many-headed, but the popular conception seems to have been that of a dog with three or two heads, with a tail ending in a serpent, or with a mane of serpents. In early art there is no well-established type. The origin of the conception of Cerberus is still a matter of dispute.

CERCA′RIA (Neo-Lat., from Gk. κέρκος, *kerkos*, tail of a beast). A larval trematode worm, in a particular stage of development. See Trematoda.

CERCELÉE, sẽr′slā′ (OF. *cercel*, Fr. *cerceau*, Lat. *circellus*, a little ring, Lat. *circus*, circle), or Recercelée. In heraldry, a cross circling, or curling at the ends, like a ram's horn.

CER′CIS. See Judas-Tree.

CERCOPES. The two gnomes who worried and robbed Hercules in his sleep. A poem, bearing their name, is attributed to Homer.

CER′COPITHE′CIDÆ (Neo-Lat., from Gk. κερκοπίθηκος, *kerkopithēkos*, long-tailed ape, from κέρκος, *kerkos*, tail of a beast + πίθηκος, *pithēkos*, ape). A family of primates, containing all the Old World monkeys, other than anthropoid apes. (See Monkey.) The several genera are described and illustrated under Baboon; Langur; Macaque, and many individual names.

CERDO′NIANS. A sect of Gnostics, founded by Cerdo, a Syrian who came to Rome about A.D. 140, and developed by his disciple Marcion. They held that there were two primal causes—the perfectly good and the perfectly evil. The good created the world, is the God of the Jews, and the author of the Old Testament. Jesus Christ is the son of the good Deity; he was sent into the world to oppose evil; but his incarnation, and consequently his sufferings, were mere appearance. Deeming the human body the work of the evil Deity, the Cerdonians prohibited marriage, wine, and flesh-eating, and advocated fasting and other austerities. Cerdo rejected the Old Testament, and all of the New, except a part of Luke's Gospel and Paul's Epistles.

CEREALS, or **CEREAL PLANTS** (Fr. *céréal*, Lat. *cerealis*, pertaining to *Ceres*, goddess of agriculture). The plants belonging to the Gramineæ, or grass family, cultivated for their seeds as an article of food. They are also called corn-plants, or bread-plants. The most common cereals are wheat (*Triticum*), barley (*Hordeum*), rye (*Secale*), oats (*Avena*), rice (*Oryza*), maize or Indian corn (*Zea*), different kinds of millets (*Setaria*, *Panicum*, etc.), and various sorghums (*Sorghum* or *Andropogon*). The word *Cerealia* is sometimes used to designate cereal plants.

CER′EBEL′LUM. See Nervous System.

CER′EBRAL HEMORRHAGE. See Apoplexy.

CER′EBRA′TION (from Lat. *cerebrum*, brain, connected with Gk. κάρα, *kara*, Skt. *śiras*, head, Ger. *Hirn*, brain, Eng. dial. *harns*, brains), Unconscious. A supposed reflex and unconscious action of the cerebrum (Lat. brain), conditioning an involuntary and unconscious elaboration and association of ideas. It "is the precise parallel, in the higher sphere of cerebral or mental activity, to the movements of our limbs, and to the direction of those movements through our visual sense, which we put in train volitionally when we set out on some habitually repeated walk, but which then proceed not only automatically, but unconsciously, so long as our attention continues to be uninterruptedly diverted from them." (W. B. Carpenter, *Principles of Mental Physiology*, London, 1879.) An illustration would be the 'cropping up' of some name or date which we have previously 'tried to recall' without avail. The phrase has now fallen into disuse, some writers referring the phenomena to a subconscious (q.v.) incubation, others invoking the known laws of association (q.v.), or emphasizing that relegation of cerebral functions to lower centres which is a consequence of the law of habit (q.v.). Consult James, *Psychology* (New York, 1890).

CER′EBRIN, $C_{80}H_{160}N_2O_{15}$ (from Lat. *cerebrum*, brain). An organic substance found in the brain, the nerves, and in pus-corpuscles, from the substance of which it may be obtained by extracting with alcohol. The cerebrin thus obtained is freed from lecithin by treatment with barium hydroxide, and purified by recrystallization from alcohol. Cerebrin is a colorless, transparent substance insoluble in water and in cold alcohol and ether. When heated with dilute acids, it is transformed into galactose and the nitrogenous substance known as sphingosin.

CER′EBRO-SPI′NAL FLUID. A clear, limpid, slightly albuminous fluid, having a saltish taste, and a faintly alkaline reaction, and not containing more than 1.5 per cent. of solid matters. It is found between the arachnoid membrane and the pia mater of the brain (q.v.) and spinal cord, within the skull and the vertebral canal, enveloping them so as to afford mechanical support and also to serve as a cushion to prevent injury from concussion, and to equalize pressure when the body is in different positions or the vessels of the brain contain varying amounts of blood, as claimed by some. It is of physiological value to the brain as lymph. In certain diseases the amount of the cerebro-spinal fluid is vastly increased. See Hydrocephalus; Nervous System.

CEREBRO-SPINAL MEN′INGI′TIS. See Meningitis.

CER′EBRUM. See Nervous System.

CEREMONIAL (Fr. *cérémoniale*, Lat. *cærimonialis*, from *cærimonia*, ceremony), Court. The origin of elaborate formalities in the daily life of a monarchical court is to be traced to the Eastern nations, whose genius is in harmony with such external expressions of reverence.

The Roman emperors were at first cautious in the introduction of such ceremonial, owing to the traditional aversion of their subjects to kingly pomp. Diocletian was the first to establish it on a large scale, and the later Byzantine emperors largely developed it. Charlemagne, on assuming the title of Emperor, introduced into western Europe a considerable amount of this formality; and the whole spirit of the feudal system, with its regular gradations of rank and its complete theoretical organization, by which every member of the body politic had his own definite place, favored its extension. Some further impulse was given by the marriage of the Emperor Otho II. to the Greek princess Theophano (972); but it reached a more elaborate development at the Court of Philip the Good, Duke of Burgundy (1419-67). This prince, whose power equaled that of the sovereigns of his time, while he could not place himself on a level with them, found satisfaction in establishing a ceremonial full of minute formalities. Through the marriage of Mary of Burgundy with Maximilian, they were introduced into the Austrian Court, where they held their ground until the reign of Joseph II. (1741-90), to whose modern ideas they were obnoxious. By dynastic connection they spread to Spain and found there a congenial soil, flourishing in all their fullness until comparatively recent times. In France ceremonial was not so elaborate until the reign of Francis II. Henry III. also took great pleasure in the ordering of stately formalities; but their establishment really dates from the marriage of Anne of Austria with Louis XIII. (1615), and her son Louis XIV. had only to put the finishing touches to the system, which is as inseparable from the idea of his reign as the wig is from any representation of his person. So burdensome did its pressure become at the French Court that Frederick the Great said he would appoint a deputy, if he were King of France, to attend to the ceremonies and leave him time for ruling. The Revolution destroyed ceremonial for a time, but Napoleon attempted to add to the prestige of his throne by its reëstablishment. The Bourbon Restoration revived it still further, but the 'July monarchy' adapted itself more to modern conditions. In England, Queen Victoria's personal taste for simplicity abridged ceremonial observance during her reign; but it was to a certain extent restored under her successor, Edward VII. See PRECEDENCE; TITLES OF HONOR.

CEREMONY (Fr. *cérémonie*, Lat. *cærimonia*, sacred rite, probably connected with Skt. *karman*, act, from *kar*, to do). Almost any act, when performed in a regular, orderly, and formal manner, and when viewed, not with reference to its object, but the mode of its performance, becomes a ceremony; and the more entirely the attention of the performers is withdrawn from the object of the act, and fixed upon the manner of its performance, the more *ceremonious* does it become. The purely formal character of ceremony is thus illustrated by Hooker: "The name ceremony," he says, "we do not use in so large a meaning as to bring sacraments within the compass and reach thereof, although things belonging to the outward form and seemly administration of them are contained in that name." The remark is applicable to the most trivial ceremonies of social life and of State pageantry, as well as to the most sacred rites of religion, for a ceremony which is its own object would scarcely be entitled to be regarded even as a ceremony. The most empty display has always the ulterior object of imposing on somebody.

Ceremonies may be divided into four classes: (1) religious ceremonies; (2) social ceremonies; (3) State ceremonies; (4) international ceremonies.

Religious and State ceremonies will be treated of respectively under their various denominations. See, for the first, LITURGY; MASS; RITE, etc.; for the second, CEREMONIAL, COURT; CORONATION; COURT; PARLIAMENT, etc. Social ceremonies will, in a great measure, fall under the heads COURTESY; ETIQUETTE; FORMS OF ADDRESS; PRECEDENCE, etc.; and international ceremonies under AMBASSADOR; CONSUL; DIPLOMACY, etc.

CEREMONY, MILITARY. A stated military exercise or formality, designed to show honor to an important person, to present the qualities of the troops concerned to advantage, or to facilitate their inspection. Ceremonies include reviews, musters, inspections, parades, guard-mounting, funeral escorts, escorts of the color, and escorts of honor, which are described under their appropriate heads.

CE′RES (probably connected with Lat. *creare*, to create, *crescere*, to grow, Gk. *κόρος*, *koros*, youth, Goth. *hairda*, Ger. *Herde*, Engl. *herd*, Engl. *hurst*, town, O. Ir. *carn*, heap, Arm. *ser*, species, Skt. *śardha*, host, Av. *sargda*, species). The name given by the Romans to the Greek *Demeter* (*Δημήτηρ*), goddess of the grain, which is regarded as her gift to mankind. In the systematized Greek mythology, Demeter is daughter of Cronos, and sister of Zeus, Poseidon, and Hades. By her brother Zeus she became the mother of Persephone or Proserpina (q.v.). In Greek worship Demeter and Persephone (or Cora) are regularly united, forming a pair of divinities, whose essential nature has become clear through the studies of Mannhardt, *Wald- und Feldkulte* (Danzig, 1875-77) and *Mythologische Forschungen* (Strassburg, 1884), also of Frazer, *Golden Bough* (2d ed., New York, 1900). At bottom, they are a dual impersonation of the 'corn spirit,' of whose worship many traces are still observable in the harvest customs of European peasants. The great legend connected with Demeter is that told in the Homeric Hymn, which preserves the sacred version of Eleusis. According to the common version, Hades (Pluto) surprised Persephone as she was gathering flowers in a meadow, and bore her away to the lower world. Demeter long sought her daughter sorrowing, until at length she learned her fate from the all-seeing Helios (the sun). In her grief she hid herself, and the earth ceased to yield her fruit. Moved at last, Zeus sent Hermes to fetch Persephone, but Hades had persuaded her to eat a pomegranate, and thus bound her to stay with him. At last, the agreement was made that she should spend two-thirds of the year with her mother and one-third with her husband. In the course of her wanderings, Demeter was kindly entertained at Eleusis, and in requital extended her special blessing to the spot, and from there sent out Triptolemus (q.v.) to bear the knowledge of agriculture to the world. The worship of Demeter was nearly universal in the ancient world, but probably the most important cult was at Eleusis in Attica, where were celebrated the Eleusinian Mysteries (q.v.). There was also a very important cult at Athens, where the Thesmophoria (see GREEK FESTIVALS) were celebrated. In Arcadia the goddesses were distinctly chthonic, and regarded as awful deities of the lower world. Swine and horses were especially connected with these deities, and they are often distinguished in works of art by a bunch of grain, or a torch, or somewhat rarely by the mystic box. Demeter also appears as a Courotrophos, that is, a guardian of children, represented as a seated figure holding a child. On vases representations of the Eleusinian story are not infrequent, and the rape of Persephone is frequent on sarcophagi, but statues of the goddesses are not common. The most striking is the beautiful seated figure from Cnidus, now in the British Museum. Fragments of the colossal cult statues at Lycosura, the work of Demophon, are now at Athens. The Romans adopted the worship of the Greek Demeter about B.C. 493, and identified her with their own goddess of the growth of the harvest, Ceres, who along with Tellus, the earth, was honored with special sacrifices, both after seed-time and just before the harvest. Her great festival was the *Cerealia*, on April 19, which was celebrated with games in the circus. In addition to Mannhardt and Frazer, cited above, consult Preller, *Demeter und Persephone* (Hamburg, 1837), and a long article by Lenormant in Daremberg and Saglio, *Dictionnaire des antiquités grecques et romaines* (Paris, 1892).

CERES. The earliest known of the planetoids (q.v.). It was first seen by Piazzi at Palermo, January 1, 1801, the very first day of the Nineteenth Century. Piazzi continued to observe its motion till February 13, when illness obliged him to discontinue his observations. News traveled slowly in those days, and the Continental astronomers did not hear of Ceres until the end of March. By that time the planet had approached too near the sun for observations to be possible. Nor did the astronomers of that day possess a method of computing planetary orbits, when the observations upon which such computations are based extended over a period of time as short as six weeks. Under these circumstances, it was not possible to predict what would be the planet's exact position on the sky when it should become visible in the following winter. There was consequently great danger of the planetoid being lost again. Fortunately, Gauss (q.v.), then only 24 years of age, quickly devised a new method of orbit computation, and succeeded in predicting the planet's motions with sufficient accuracy to enable Von Zach and others to re-observe Ceres at the end of the year, when Gauss's computations had become available.

CERES. An ancient statue of the Grecian goddess of the grain, now standing in the Munich Glyptothek. It is a striking example of sculpture in different colored stone. The head and lines are of white, the draperies of black marble.

CE'REUS (Lat., waxy, from *cera*, wax). A genus of plants of the order Cactaceæ, containing 100 or more species, among which are some of the most splendid flowers of that order. The species abound in the southwestern part of the United States, extending through Mexico and Central America into South America. One of these is *Cereus speciosus*, one of the most common greenhouse plants in the United States, and sometimes cultivated even in windows. Its large flowers are of a fine scarlet color, the inner petals with a violet tinge. The fruit, when well ripened, is of a delicious flavor. The plant is a native of Mexico.

A number of species are grown under the name of night-blooming cereus. Of these, *Cereus nycticalus*, *Cereus triangularis*, and *Cereus grandiflorus* are the best known. Their large, fragrant, white flowers are exceedingly beautiful. Some of the species are truly arborescent — the Suwarro, *Cereus giganteus*, of Arizona, California, and northern Mexico, attaining a height of 50 feet or more and 18 inches to 2 feet in diameter. The fruits of this species are eagerly sought for food by the natives. *Cereus pasacana*, of Argentina, is a similar tree-like form. They branch sparingly and resemble huge candelabra in outline. The night-blooming forms have cylindrical or angled stems, and are trailers or climbers. The others vary in form between these extremes.

CE'RIA'LIS, PETILIUS. A Roman general, first encountered in connection with his defeat, as legate of the ninth legion, by the insurgent British forces of Boadicea. In A.D. 69, when Vespasian claimed the Empire, Cerialis hastened to join Vespasian's army in Italy, and was appointed a general under Antonius. He was assigned to the command of an advance body of cavalry, and was afterwards defeated in a slight skirmish just without Rome. Having crushed the revolt of Civilis he was sent in A.D. 71 to Britain as consular legate to the Roman Government there, and in that capacity in great part subjugated the Brigantes. Agricola served under him as commander of the twentieth legion.

CERIGNOLA, chā'rē-nyō'lȧ. An ancient city in southern Italy, 23 miles southeast of Foggia, on a hill in a fertile but treeless plain (Map: Italy, K 6). It markets cotton and oil, and is celebrated for the victory won April 28, 1503, by the Spaniards over the French, which established Spanish authority in Naples. Population, in 1881 (commune), 24,000; in 1901, 34,195.

CERIGO, chā'rē-gō, or KYTH'ERA (anc. *Cythera*, *Kythera*). One of the largest of the Ionian islands, situated off the southern coast of Greece in about latitude 36° 15' N., longitude 23° E. (Map: Greece, D 6). Area, 107 square miles. Its surface is mountainous, reaching an altitude of 1650 feet, and the soil is barren. Corn, wine, and olives are raised, and some cattle. The island is noted for its two beautiful caverns. In ancient times Cythera was considered the sacred abode of Venus. Population, in 1889, 10,524. The chief port is Kapsali.

CER'IMON. A lord of Ephesus, in Shakespeare's *Pericles*. He has been a student of medicine and saves the life of Thaisa, daughter of Simonides, who was supposed to have died at sea.

CERIN'THUS (Lat., from Gk. Κήρινθος, *Kērinthos*). A heretic who lived at the close of the Apostolic Age, but of whom we have nothing better than uncertain and confused accounts. It is said that he was an Egyptian, perhaps also a Jew by birth, and studied philosophy in Alexandria. From Egypt he passed into Asia Minor.

and lived in Ephesus contemporaneously (according to the belief of the Church) with the aged Apostle John. Tradition tells us that John held the heretic in such detestation, that, on a certain occasion, when he encountered Cerinthus in the baths of Ephesus, he immediately left the place, saying to those about him: "Let us flee, lest the bath should fall while Cerinthus, the enemy of the truth, is there." It was believed in the ancient Church that the Gospel of Saint John was written in opposition to the tenets of Cerinthus; and the Roman presbyter Caius (about the close of the Second Century) supposed that Cerinthus had revenged himself by falsely ascribing the authorship of the Apocalypse to Saint John—it being in reality his own work! The fathers contradict one another in their accounts of Cerinthus. Some describe him as a complete Gnostic, in which case he would be the earliest recorded teacher of that sect; others say that he held coarse and sensual millenarian views, making the *millennium* (q.v.), with the licentious fancy of an Arab, consist chiefly in 'nuptial delights,' and that he believed the Jewish ceremonial law to be in part binding upon Christians. There can be no doubt that Cerinthus made use of the Jewish law at least as a symbol for his Gnostic doctrines, and also employed millenarian terms in a symbolical manner; a very natural thing for him to do, on the hypothesis which Neander and others have suggested—that Gnosticism originated, not among the minds which had received a true Hellenic culture, but among the Judaizing sects, whose theosophy was a jumble of the spiritual and the material. Cerinthus being the oldest teacher of Judaico-Gnostic principles, there would naturally be a greater incongruity and want of harmony in his language and ideas than characterized Gnosticism at a later period of its development; and subsequent ecclesiastical writers, destitute of precise historical knowledge and sound principles of criticism, could hardly avoid misunderstanding a system which is not consistent throughout, but bears evident marks of being formed in a transition epoch.

CE'RITE (from Neo-Lat. *cerium*). A hydrated cerium silicate of complex composition containing other metals of the cerium group, as didymium and lanthanum. It crystallizes in the orthorhombic system and is of a brownish red color. It is found at Bastnäs in Westmanland, Sweden, and is the chief source of the element cerium. A partial separation of the metals contained in cerite may be effected by treating the mineral with sulphuric acid and separating the resulting sulphates by taking advantage of the differences in their solubility. Cerium may then be completely isolated from the insoluble portion by converting this into nitrate and subjecting to a process of decomposition, the nitrate of cerium being more readily broken up by heat (and hence rendered insoluble) than the other nitrates present.

CE'RIUM (Neo-Lat., named after the planet *Ceres*). A metallic element discovered by Berzelius in 1803. It is not found native, but occurs combined in many Swedish minerals, especially as the silicate in cerite, which contains 56 per cent. of cerium peroxide. It also occurs in samarskite, a mineral found in North Carolina. After cerium has been isolated from the other constituents of cerite (q.v.), it may be obtained in the metallic state by the electrolysis of its anhydrous chloride, or by fusing the latter with metallic sodium.

Cerium (symbol, Ce; atomic weight, 140) is a steel-gray, ductile, and malleable metal whose melting-point is higher than that of silver. Its specific gravity varies between 5.5 and 6.63. It forms two series of salts, the cerous and ceric. Cerous sulphate is used to produce a deep, blue-black color on fabrics. Cerous oxalate is sometimes used in medicine, especially for the vomiting of pregnancy.

CERNUSCHI, chĕr-nōōs'kê, Enrico (1821-96). An Italian economist. He was born in Milan, and took part in the Italian Revolution of 1848, in which he was an ardent Republican. In 1850 he took refuge in France and engaged in banking. He became a principal stockholder of *Le Siècle*, and discussed in that journal economic subjects with considerable ability. Owing to his denunciation of socialism, his life was in great peril from the communists in 1871. He left France and visited Egypt, China, and Japan, bringing back valuable ethnological and art collections. These he bequeathed to the city of Paris, and they now form the Musée Cernuschi, opened in 1898. He visited the United States in 1877, and delivered many addresses on economic questions, championing the cause of bimetallism. Among his works are: *Mécanique de l'échange* (1865); *Contre le billet de banque* (1866); *Illusions des sociétés coopératives* (1866); *Or et argent* (1874); *Silver Vindicated* (1876); *Le Bland bill* (1878); *Le bimétallisme à quinze et demi* (1881); and *Le grand procès de l'union latine* (1884).

CE'RO (from Sp. *sierra*, saw, sawfish, from Lat. *serra*, saw). An uncommon marine fish (*Scomberomorus regalis*) similar to, but larger than, the Spanish mackerel, reaching 20 pounds in weight. It belongs to the western Atlantic. Another species, the sierra (*Scomberomorus caballa*), is called 'king-cero,' and may weigh 100 pounds, and is found in the warmer parts of the Atlantic. Both are good food.

CEROG'RAPHY (from Gk. κηρογραφία, *kērographia*, encaustic painting, from κηρογραφεῖν, *kērographein*, to paint with wax, from κηρός, *kēros*, wax + γράφειν, *graphein*, to write). The art of painting with wax. It was employed by Greek and early Roman painters. Wax, as a medium, is sometimes used by our modern mural painters, as it gives the dull effect of fresco painting, more suited to mural work than the disturbing effect of oil, which shines in spots at certain angles of light. See Encaustic Painting.

CE'ROPLAS'TIC (Gk. κηροπλαστικός, *kēroplastikos*, modeling in wax, from κηρόπλαστος, *kēroplastos*, molded in wax, from κηρός, *kēros*, wax + πλάσσειν, *plassein*, to mold). The art of modeling in wax. See Waxwork.

CERNY, chĕr'nê, Frederick. See Guthrie, Frederick.

CERQUOZZI, chĕr-kwôt'sê, Michelangelo (1602-60). An Italian painter, born in Rome. He began his art as a painter of fruit and flowers under Pietro Bonzi, but afterwards devoted himself to battle pictures and was called 'delle Battaglie.' There are pictures by him in the principal museums of Europe, but his best work is in Rome, "The Four Seasons" (Palazzo Salviati).

CERRITO, chĕr-rē'tō, Francesca, called Fanny (1821 —). A French ballet-dancer, born in Naples. She made her début in Paris in a ballet, *La fille de marbre*, written by her husband, M. Saint-Léon (1847). She also appeared in *La vivandière*, *Le violon du diable*, and in *Gemma*, the scenery of which she designed with Théophile Gautier. So great were her talents and charm that the Italians have called her 'the fourth grace.' She retired from the stage in 1854.

CERRO DE PASCO, sĕr'rō dȧ päs'kō. The capital of the Peruvian Department of Junin, situated in a sterile region 14,000 feet above sea-level, at the northern end of Lake Chinchaycocha (Map: Peru, B 6). The temperature averages 40° the year round. The town is poorly built over the silver-mines which make it famous. They are, however, not so productive as formerly. Population, about 14,000.

CERRO GORDO (Sp., Big Mountain). A mountain pass near Jalapa, on the National Road between Vera Cruz and the City of Mexico. Here, on April 18, 1847, during the war between the United States and Mexico, General Scott, with a force of 8500, dislodged and defeated General Santa Anna, with a force of about 12,000. While Scott was advancing from Vera Cruz, the Mexicans had strongly intrenched themselves in a position which seemed impregnable, their right resting on a precipice rising above an almost impassable ravine, and their left occupying the heights of Atalaya and Cerro Gordo. Scott, arriving before the fortifications on April 14, spent two days in reconnoitring, and on the 17th sent General Twiggs by a precarious pathway to take the high ground on Santa Anna's left, and then, if possible, cut off his retreat by occupying the Jalapa road in his rear. Twiggs succeeded in taking Atalaya on the 17th, and on the following day the Americans attacked with great vigor in front and flank, taking the height of Cerro Gordo, capturing the Mexican camp, securing 3000 prisoners, and forcing the rest of the Mexican army in great confusion from the field. The Americans lost 63 killed and 368 wounded (General Shields being among the latter): the Mexicans, probably as many as 1000, though the exact figures have never been ascertained. The victory enabled Scott to advance toward the City of Mexico, and did much toward demoralizing the Mexican troops. Consult: Bancroft, *History of Mexico*, Vol. V. (San Francisco, 1885); Wright, *General Scott* (New York, 1894); and C. M. Wilcox, *History of the Mexican War* (Washington, 1892).

CERTALDO, chĕr-täl'dō. A town in central Italy, 35 miles southwest of Florence (Map: Italy, F 4). Here Boccaccio lived and died. His house, restored in 1823 by Countess Carlotta Lenzoni-Medici, and the original site of his tomb are objects of general interest. Population, in 1881 (commune), 8000; in 1901, 9129.

CERTHIADÆ. See Creeper.

CERTIFICATE (Fr. *certificat*, from Med. Lat. *certificatus*, p.p. of *certificare*, to certify, from Lat. *certus*, sure + *facere*, to make). A written testimony to the truth of a certain fact or facts. It may be required or authorized by law, when it has an official character and is receivable as evidence of the facts therein stated; or it may be voluntary, when it has no greater value as evidence than any other private writing. Examples of legally authorized certificates are certificates of an insolvent's or a bankrupt's discharge; certificate of the appointment and qualification of a person as the administrator of a decedent's estate, or as a notary public, or other officer; certificate that a ship has been registered: certificate by a notary public or similar officer that the execution of a document has been duly acknowledged before him. For the legal effect of such certificates as evidence, consult the authorities referred to under Evidence.

CERTIFICATE OF MERIT, United States Army. A certificate of merit, awarded on the recommendation of his commanding officer to an enlisted man who has distinguished himself in the service. According to Article XXV, United States Army Regulations, recommendations for a certificate of merit must originate with an eye-witness, preferably the immediate commanding officer. Each case must be submitted separately, forwarded through the regular channels, and must be favorably indorsed by each commander. Extra pay at the rate of $2 per month from the date of distinguished service is allowed to each enlisted man to whom a certificate of merit is granted.

CERTIORARI, sẽr'shĭ-ō-rā'rī (Lat., to be certified, from *certior*, comparative of *certus*, sure). A common-law writ issued by a superior court to an inferior one, or to a body acting in a quasi-judicial capacity, such as commissioners, magistrates, assessors of taxes, etc. The writ issues only when there is no other adequate remedy, and it is used in both criminal and civil cases. It requires the record of a proceeding in the inferior court or before the quasi-judicial body to be certified by that court or body and returned to the court issuing the writ for the purpose either of reviewing the same or of removing the action or proceeding to the higher court for trial. When certiorari is used as a means of review, questions of law, rather than those of fact, are involved, determining whether the inferior court had jurisdiction or proceeded in accordance with law. For example, if a board of assessors of taxes should decide that the property of a bank invested in United States bonds could be taxed under the authority of the State, they would decide a question of law which might, by means of a writ of certiorari, be reopened before superior tribunals, and ultimately before the Supreme Court of the United States. It would not, however, raise any question of fact or confer upon the superior court any ministerial power vested in the board of assessors of taxes. The writ is granted or refused at the discretion of the superior court, and the usual result is that the proceedings below are either affirmed or set aside. In courts of equity a similar use is made of certiorari, which may be granted on application by original bill under the 'Evarts Act' of March 3, 1891. Certain decisions of the Circuit Court of Appeals may be reviewed by the United States Supreme Court by certiorari.

In England, certiorari issues in civil cases out of the chancery division of the High Court of Justice, and in criminal cases from the King's Bench division of the same court. It is now chiefly used in the latter division, and is the usual mode of correcting excesses of justices of the peace in miscellaneous matters. Consult: Spelling, *Treatise on Extraordinary Relief in Equity and at Law* (Boston, 1901); Wood, *Treatise on the Legal Remedies of Mandamus and Prohibition*, etc. (3d ed., Albany, 1896).

CERTOSA, chĕr-tō′sȧ (It.). A monastery of the order of Carthusians (q.v.), whence the Italian name is derived. The most famous is the Certosa di Pavia in Lombardy, one of the most complete and beautiful monuments of Italian art, erected with the coöperation of several generations of the greatest Lombard artists. It was founded in 1396 by Gian Galeazzo Visconti, and begun in the same late Gothic style as the cathedral of Milan, but before the nave had been completed in this style, the influence of the early Renaissance had become supreme, and the choir and transept, as well as the beautiful cloisters, were executed in the new style, with rich and artistic details in terra-cotta, as was also the façade, begun in its present form in 1491. This is the masterpiece among Renaissance façades, not only for the richness and perfection of its sculptures, but for the harmony of its design. The interior of the church is a Latin cross (249 × 173 feet), with eight heavy piers, fourteen chapels, apsidal transepts, and a dome over the intersection. It is a museum of Renaissance sculpture and painting, most of the latter the work of Borgognone, including the designs for the choir-stalls. The sepulchral monument of the founder is mainly by Cristoforo Romano. The most famous sculptors who worked on the cloisters and façade were the brothers Montegazza, Amadro, Fusina (Fifteenth Century), Brioseo, Giacomo della Porta, Busti, and Solari (Sixteenth Century). This monument was the practical school at which the Lombard school of sculpture developed throughout its golden age.

CERU′MEN (Neo-Lat., from Lat. *cera*, wax). Ear-wax, a yellow, oily secretion from certain glands lying in the external auditory canal, or the passage that leads from the external opening of the ear to the membrane of the tympanum. Its use is to render the skin of this part pliable, as it is a variety of sebaceous matter, and also to entangle dust, etc., which may enter the canal, and thus secure its removal. Its bitter taste prevents insects from entering the auditory canal. The motion of the jaw in eating and talking should loosen the wax, and, by working it outward, prevent its accumulation. When it does accumulate, it causes partial deafness, and also a buzzing noise in the head, from adhering to the ear-drum. It must be removed by syringing in such cases.

CE′RUSE (Fr. *céruse*, Lat. *cerussa*, white lead, from *cera*, wax), Flake-White, Kremnitz White, and Nottingham White. Names sometimes applied to white lead (q.v.). The name ceruse is also applied to cerusite (q.v.).

CE′RUSITE (from *ceruse*, from Lat. *cerussa*, white lead). Natural lead carbonate ($PbCO_3$). It crystallizes in the orthorhombic system and has a vitreous or pearly lustre, and is of a gray or grayish-black color, sometimes tinged with blue or green, owing to the presence of salts of copper. It is formed by the alteration of galena or lead sulphide, which, as it oxidizes to sulphate, may be changed to a carbonate by means of solutions of calcium bicarbonate. The most famous localities are the lead-mines of Siberia, and the Altai region; also various places in Sweden and Germany, while fine crystals are found in Cornwall, England. In the United States it occurs at Phenixville, Pa., and at lead deposits in Virginia, North Carolina, Missouri, Wisconsin, Colorado, Utah, and Arizona. Dana reports its observation as a recent formation at Pompeii, Italy, and at Laurium, Greece; also in stalactical crusts near Kommern, Rhenish Prussia.

CERVANTES SAAVEDRA, sĕr-văn′tēz, *Sp. pron.* thĕr-vän′tās sä′ȧ-vä′drȧ, Miguel de (1547-1616). The most famous of all Spanish writers, and author of the world-renowned *Don Quixote*. His early years are involved in much obscurity. It is known that he was of pure Castilian stock, being the second son of Rodrigo de Cervantes and Leonor de Cortinas; that his birthplace was Alcalá de Henares, although for 200 years this was a matter of dispute, seven cities claiming the honor; and that he was baptized October 9, 1547, whence it is plausibly conjectured, in view of his name, that he was born on the Michaelmas Day preceding. There is a tradition, now generally discredited, that Cervantes spent two years at the University of Salamanca. What is definitely known is that he studied under Lope de Hoyos, a teacher of some celebrity in Madrid; and when, on the occasion of the death of Isabel of Valois, Philip II.'s third wife, Hoyos edited a memorial volume of verse, six of the poems were contributed by Cervantes, his earliest known essay in literature. But his practical education in the knowledge of life—the education which comes from action and hardship and disappointment—still lay before him. At 21 he left Spain in the suite of the special nuncio, Giulio Acquaviva, who was returning to Rome. Here a new crusade was being organized against the Turks, and Cervantes soon caught the prevailing contagion. He enlisted in a regiment of Spanish infantry, and played a gallant part at the battle of Lepanto, receiving wounds one of which crippled his left hand for life, "for the greater glory of his right," as he phrased it. He also took part in engagements before Navarino, Corfu, Tunis—after which he was for a time again in Italy, and there presumably acquired that knowledge of the language which later bore fruit in the slight coloring of Italian idioms that are to be found in even his best pages. In 1575 he set sail for Spain, but the vessel was seized by Algerine pirates and all on board carried into Algiers as prisoners.

Cervantes's captivity lasted for five years, during which he showed noteworthy fortitude and intrepidity, offering himself as leader in all attempts of the Christians to escape, attempts always frustrated at the last moment; forced to witness the almost daily atrocities which his owner, Hassan Pasha, practiced upon his fellow-prisoners, and often himself threatened with inhuman tortures, although, through some unexplained influence, the threats were never carried out. Finally the sum demanded for his ransom, painfully raised by his widowed mother and sister, and eked out by the efforts of a pious friar, Juan Gil, and some Christian merchants in Algiers, was paid, and Cervantes was free to return to Spain. This period of his career deserves to be dwelt upon, for it was here that his character was ripening and the foundation being laid for that wide understanding of human nature which makes his great work a delight to all peoples and at all times. It was this ordeal which waked the soldier, the 'mutilated of Lepanto,' from his dream of romance, and prepared him for transition into the writer capable of the higher and finer humanity of the *Don Quixote*. The plays which he is said to have written in captivity are lost. The earliest known literary efforts after his return to Spain are some sonnets published in 1583, the year before his marriage to Catalina de Palacios Salazar, a young lady of good family from Esquivias, in New Castile. Little is known of the marriage beyond the fact that she bore him no children, and that she outlived him by ten years. It is said, however, that while courting her he found inspiration to write his pastoral novel, the *Galatea*, published in 1585. Extravagant, artificial, and affected, like others of its type, it nevertheless served to bring Cervantes into notice; and, although never finished, seems to have been regarded by him to the last with especial fondness, for in *Don Quixote* he makes the Barber say: 'This book has some invention; it proposes something and concludes nothing; it behooves us to wait for the second part which he promises." To this and the following years belong a long line of dramas—twenty or thirty according to his own account. Of most of these even the titles have perished. We know of the *Gran Turquesca;* the *Jerusalén;* the *Batalla naval;* the *Amaranta;* the *Bosque amorosa;* the *Arsinda*, and the *Confusa*, which the author flattered himself was "good among the best of the comedies of the cloak and sword." The two surviving plays are *El trato de Argel* (Life in Algiers) and *La Numancia*, which deals with the siege of Numantia and its capture by Scipio Africanus. Together these two plays show the best and the worst of Cervantes's dramatic talent. The former is an incoherent medley of personal reminiscences, in which demons and lions and such moral abstractions as Necessity and Opportunity are introduced side by side with real characters. *La Numancia* is a tragedy of heroic energy and intense pathos, which has justly excited the admiration of Shelley, Goethe, and August Schlegel, and is little less than remarkable when we remember that Shakespeare had not yet written, and neither Corneille nor Racine had been born. Nevertheless, it must be recognized that Cervantes was practically a failure as a dramatist, and in 1588 was forced to leave the Madrid stage, which was before Lope de Vega had begun to write plays—a fact that disposes of the legend that he was driven out by Lope. For the next few years he lived in straitened circumstances. In 1588 he received the position of commissary at Seville, under the Provedor-General of the Indian fleet. He seems to have held this place until 1593. In 1594 he was made tax-gatherer in Granada, but three years later not only lost the position, through an absconding subordinate, but suffered a three months' imprisonment besides. In 1605, while residing in Valladolid, he once more appeared as an author, this time destined to win immortal fame. In writing *Don Quixote*, which popular tradition says was begun in jail, Cervantes's avowed purpose was "to diminish the authority and acceptance that books of chivalry have in the world and among the vulgar." Yet he did not intend to burlesque the old Spanish knight-errantry, for this was already a thing of the past. He sought rather to put an end to the absurd and affected romances which it was then the fashion to read; and how well he succeeded is attested by the fact that after the appearance of *Don Quixote* no new chivalresque romance was published in Spain. What further purpose Cervantes had, and what hidden allegoric meaning lurks in *Don Quixote*, has provoked endless controversy. One of the latest critics of Spanish literature, Mr. Fitzmaurice-Kelly, has very sensibly said: "That an allegory of human life was intended is incredible. Cervantes presents the ingenious gentleman as a prince of courtesy, affable, gallant, wise on all points save the trifling one which annihilates time and space and changes the aspects of the universe; and he attaches to him Sancho, self-seeking, cautious, practical in presence of vulgar opportunities. The types are eternal. But it were too much to assume that there exists any conscious symbolic or esoteric purpose in the dual presentation." Carlyle, with curious ineptitude, calls *Don Quixote* "our joyfullest modern book." He would have done well to recall that the Barber in *Don Quixote* speaks of Cervantes as "rather a man of sorrow," and to have heeded Landor, who says that readers who see nothing more than a burlesque in *Don Quixote* have but a shallow appreciation of the work.

Though received with enthusiasm, *Don Quixote* brought no pecuniary reward to the author. After a silence of several years, he produced, in 1613, his twelve *Novelas exemplares* (Exemplary Tales); in 1614 his *Viage al Parnaso* (Voyage to Parnassus), a rhymed review of contemporary poets; and in the following year a volume of mediocre dramas. At this time, while engaged upon the second part of *Don Quixote*, Cervantes learned that a certain Alonzo Fernandez de Avellaneda, at Tarragona, had published a spurious continuation, a cynical and amusing volume, which had the effect of spurring on Cervantes to the completion of the true continuation, which otherwise might never have been finished. Cervantes died April 23, 1616, just after completing his last novel, *Persiles Sigismunda*, which was published posthumously.

Of the many editions of *Don Quixote*, the following may be mentioned: The first edition (Madrid, 1605; second part, 1615); that by Pellicer (Madrid, 1797-98); that of Diego Clemencia (Madrid, 1833-39), containing an excellent commentary; a photographic reproduction of the first edition (Barcelona, 1871-74); and a recent critical text, edited by Fitzmaurice-Kelly, in course of publication (London, 1889 et seq.). *Cervantes, Obras Completas* (in 12 vols.), appeared in 1863-64. The earliest English version is that of Sheldon (London, 1612-20; latest reprint, by Henley, 1896). Later renderings deserving mention are: Ormsby's (London, 1885), Duffield's (London, 1881), Watts's (London, 1894). The latter contains a lengthy biography. Mr. Watts has also contributed a short "Life of Cervantes" to the *Great Writers Series*, which includes a brief but convenient bibliography.

Among the various other accounts of his life and works are: Navarrete, *Vida de Miguel Cer-*

vantes (Madrid, 1819); Chasles, *Michel de Cervantes, sa vie, son temps, son œuvre* (Paris, 1866); Baumstark, *Cervantes Saavedra* (Freiburg, 1875); Merimée, *La vie et l'œuvre de Cervantes* (Paris, 1877); Mainez, *Vida de Cervantes* (Cadiz, 1878); Dorer, *Cervantes und seine Werke*, with bibliography (Leipzig, 1881); Kelly, *Life of Miguel de Cervantes* (London, 1892); Dumaine, *Essai sur la vie et les œuvres de Cervantes* (Paris, 1897). For an exhaustive bibliography of his writings, consult Rius, *Bibliografia critica de las obras de Cervantes Saavedra* (Madrid, 1900).

CERVERA Y TOPETE, thĕr-vā′rȧ ā tō-pā′tȧ, Pasqual, Conde de Jerez, Marques de Santa Anna (1833—). A Spanish admiral, born in Jerez, in the Province of Cadiz. His father was one of the wealthiest wine-merchants of Spain; his mother a daughter of Count Topete y Velle, a member of the royal family. Cervera was educated at San Fernando (1848-51), and after his graduation served on several training-ships. He distinguished himself during the campaign against Morocco in 1859, and was appointed a first lieutenant. He was a member of the Spanish expedition against Cochin China in 1862, and afterwards was appointed attaché of the Spanish legation at Washington. Subsequently he was promoted to the rank of captain, and was put in command of a vessel sent to Peru during the war of 1866. Upon the outbreak of the Ten Years' War in Cuba (1868-78) he was engaged in the blockade of Cuban ports, but was recalled by the Government and appointed Secretary of the Navy in the Spanish Cabinet. He was advanced to the rank of admiral, and soon thereafter placed in command of the *Pelayo*, the original first-class battle-ship of the Spanish Navy. He was next appointed adjutant to the Queen Regent, and was made chief of the Spanish commission sent to the European Naval Conference held in London in 1891.

Upon the outbreak of the Spanish-American War he was placed in command of the squadron sent to America, consisting of the cruisers *Infanta Maria Teresa*, *Cristóbal Colon*, *Almirante Oquendo*, and *Vizcaya*, and the torpedo-boat destroyers *Terror*, *Furor*, and *Pluton*. The fleet left Cadiz April 8th and the Cape Verde Islands April 29th. From this latter date Cervera eluded the American fleet, and his whereabouts caused much apprehension, especially in the cities along the Atlantic Coast. He had shaped his course for Cuba, however, and about May 19th his squadron entered the harbor at Santiago, where it was blockaded by American vessels under the command of Admiral Sampson. On July 3d—by the express orders of his Government, it is said—Cervera made a bold dash from the harbor and gave battle to the American vessels; but in the running fight which ensued his fleet was destroyed and he was taken prisoner by Lieutenant Wainwright of the *Gloucester*. By reason of his exceptional bravery, his courteous and dignified bearing, and his generous conduct toward Lieutenant Hobson, he was made the object of much official and popular courtesy. Immediately after the battle President McKinley gave him permission to communicate with his family by cable, and he received many other personal attentions. On July 10 he was taken to Portsmouth, and thence to Annapolis (July 16). With the members of his staff he sailed for Spain on September 12, 1898, and arrived at Santander September 21. Upon his return to Spain he was subjected to court-martial, a procedure usual in European countries, in order that all the facts relative to a defeat or other disaster may be fully known, and the blame or reason for such defeat or disaster fairly placed. He was acquitted and liberated, July 7, 1899.

CERVETERI, chĕr-vā′tâ-rē, or **CERVETERE**, -tâ-rā. A village on the site of the ancient Cære, in south Etruria, near the Tyrrhenian Sea, in the district of Civita Vecchia, 32 miles west of Rome. The ancient town, which was said to have borne the name Agylla before the Etruscan conquest, became one of the twelve Etruscan cities. According to Roman tradition, it afforded refuge to the Tarquins after their expulsion from Rome, and was by the Romans chosen as the safest hiding-place for the Vestals and the sacred treasures during the occupation of the capital by the Gauls. Under the Republic and Empire the city continued to exist, but later steadily declined, and about 1250 was deserted by a large portion of its inhabitants, who removed to the present village of Ceri. As Cære was said to be the first city admitted to the Roman State as a *municipium sine suffragio*, or without the right of suffrage, the name Cærites became typical for citizens of such *municipia*. Near the ancient city have been found a large number of fine Etruscan chamber tombs, many of which were richly decorated with paintings and reliefs. Among the most famous are the Regulini-Galassi, which yielded in 1836 a rich harvest of gold ornaments, arms, etc., and the tomb of the Tarcna, the Etruscan name which the Romans transferred to Latin as Tarquinii. Consult Dennis, *Cities and Cemeteries of Etruria*, I. (rev. ed., London, 1878).

CERVIA, chĕr′vē-ȧ. An interesting city in north Italy, on the Adriatic, 13 miles southeast of Ravenna (Map: Italy, G 3). It has a beautiful cathedral and a theatre, and markets much salt from the lagoons east of the town. Population, in 1881 (commune), 7000; in 1901, 7942.

CER′VIDÆ (Neo-Lat., from Lat. *cervus*, stag). That family of ruminants which embraces all the deer. (For characteristics, see Deer.) It is subdivided into musk-deer (Moschinæ) and true deer (Cervinæ), the latter including many genera, described under Brocket; Deer; Elk; Guemal; Muntjac; Reindeer, etc., or under individual names, as Moose; Sambar; Wapiti, etc. For classification of genera and species, consult Brooke, in *Proceedings Zoological Society of London* (London, 1878, illustrated).

CERVIN, sĕr′văɴ′, Mont. See Matterhorn.

CER′VUS. See Deer; Elk.

CESALPINO, chā′zȧl-pē′nō, Andrea (Lat. Cæsalpinus) (1519-1603). An Italian botanist and physiologist. He was born in Arezzo, Tuscany, studied at the University of Pisa, and for many years was professor of botany there. Thence he was summoned to Rome to become physician-in-ordinary to Pope Clement VIII. and professor of medicine at the Sapienza College. He published a work of metaphysical speculation, *Quæstiones Peripateticæ* (1571), based on Aristotle. In his *Katoptron, sive Speculum Artis Medicæ Hippocraticum* (1601), he stated the theory respecting the circulation of the blood which Harvey, by his subsequent experimental researches, definitely established. He is best known, however, for his *De Plantis* (1583), in which he presented the first botanical system philosophically constructed according to a natural order of classification. The indebtedness of Linnæus to him is considerable. Among his other works are a *Dæmonum Investigatio Peripatetica* (1580).

CESANA, chå-zä'nå, Giuseppe Augusto (1821—). An Italian journalist. He was born in Milan, October 8, 1821, studied law, but soon abandoned that profession, and in 1854 established in Turin *L'Espero*, the first of many important journals which owed their existence wholly or in part to his enterprise. *Il Pasquino* was founded soon after, in conjunction with Piacentini; the *Corriere italiano* (1865) was an individual venture; *Il Fanfulla* (1870), the joint creation of Cesana, Piacentini, and De Rensis. Eighteen years later he left *Il Fanfulla* to accept the editorship of *L'Italie*, an influential paper published in Rome in the French language, which he directed with much success until his retirement in 1893. Cesana is also the author of several novels, the first of which, *Tommaso Canella*, is remembered chiefly because its title afterwards became the author's pseudonym. His son, Luigi Cesana, is also a prominent journalist, and since 1878 proprietor and editor of the *Messaggero*.

CESARI, chå'zå-rê, Antonio (1760-1828). An Italian philologist, born in Verona. He is known by his attempt to restore to the Italian language of the day the purity and virility of the Renaissance. His monumental *Vocabolario della Crusca* was published in 1806-09, and his other works include *Alcune novelle* (1810); *Bellezze della Commedia di Dante* (1824-26).

CESARI, Giuseppe, Cavaliere d'Arpino (c.1565-1640). An Italian painter, born in Rome. He was a pupil of Roncalli, and is a noteworthy example of the fact that, despite the traditions of the Renaissance, bad art could flourish and be popular in Italy in the Seventeenth Century. Cesari was encouraged in Rome, and so munificently rewarded for his works that he rested content with a facility of handling that which readily gave pleasure, and became indifferent to a thorough study and practice of his art. Both drawing and perspective were so at fault in his work that he was considered to have had a most pernicious influence on public taste. He was greatly opposed to the Carracci School, and rather identified himself with the 'Idealists,' but after his own line and methods. His frescoes in the Capitol are well colored, and are deemed his best work. His finest pictures are "Diana and Actæon" and "Bathing Nymphs." He died July 3, 1640.

CESAROTTI, chä'zå-rôt'tê, Melchiore (1730-1808). An Italian poet. He was born and educated in Padua, where his brilliant promise as a student won him, at an early age, an appointment to teach rhetoric in the university, and in 1768 he was elected to the chair of Greek and Hebrew. Although an old man when the French invaded Italy, he warmly espoused their cause, and received a pension from Napoleon, in whose honor he wrote an adulatory poem, "Pronea," and who later made him Knight and then Commander of the Iron Crown. Cesarotti was a prolific writer, and his collected works fill forty ample volumes (Pisa, 1800-13). Besides a much over-praised rendering of the *Iliad*, his many translations include Æschylus's *Prometheus*; selections from Demosthenes and Juvenal; several of Voltaire's tragedies; and Gray's *Elegy*. Most important of all was his *Ossian*, which owed its great vogue in Italy to the novelty of its mingled chivalry and sentimentalism, and visibly influenced the style of Alfieri, Monti, and other writers of the younger generation. Consult: Barbieri, *Memorie intorno all' abbate Cesarotti* (Padua, 1810); and more recently, Alemanni, *Un filosofo delle lettere* (Turin, 1894).

CESENA, chå-zā'nå. A city in central Italy, 52 miles southeast of Bologna (Map: Italy, G 3). It is pleasantly situated on the Savio, and has a lyceum, a gymnasium, a technical school, and a seminary. The cathedral contains two fine marble Fifteenth and Sixteenth Century altars, and the handsome city hall has a colossal statue of Pius VI., who, like his successor, Pius VII., was born here. In the library (founded in 1452 by Domenico Malatesta Novello) are 4000 MSS., many of which were used by Aldus Manutius in preparing his famous editions of the classics. On a hill near the town is the Church of Santa Maria del Monte, attributed to Bramante, with Fifteenth Century carved stalls. Cesena markets hemp, wine, vegetables, and silk and refined sulphur. It was already famous for its wines in Roman times. In the Middle Ages it became subject to the Ghibelline family of Montefeltro, then to the Guelf family of Malatesta (see Dante, *Inferno*, xxvii. 53), and afterwards it was seized by Cesare Borgia and incorporated with the Papal territory. Population, in 1881 (commune), 38,000; in 1901, 42,240.

CESNOLA, chĕs'nō-lå, Luigi Palma di, Count (1832-1904). An Italo-American archæologist. He was born near Turin, Italy, was educated at the Royal Military Academy there, and served in the Sardinian Army during the war against Austria in 1849, and, as staff officer, in the Crimean War. He came to New York in 1860, where he engaged in teaching languages. He volunteered for service at the outbreak of the Civil War, and, as colonel of the Fourth New York Cavalry, took part in many engagements until June, 1863, when he was wounded and taken prisoner. At the close of the war he was brevetted brigadier-general, was naturalized, and was appointed consul at Cyprus. He then spent some time in making a valuable archæological collection, which in 1873 became the property of the Metropolitan Museum of Art, in New York City. Five years later he was appointed director of that institution. The following year his collections were the subject of a long and bitter controversy, their genuineness being questioned by art critics, but in the end General Cesnola's work was generally accepted as trustworthy. He has published *Cyprus, Its Ancient Cities, Tombs, and Temples* (1878); *The Metropolitan Museum of Art* (1882); and numerous pamphlets on art subjects.

CÉSPEDES, thās'på-dås, Pablo de (1538-1608). A Spanish painter, architect, sculptor, and man of letters. He was born in Cordova, of a noble Castilian family; was educated at the University of Alcalá de Henares, and studied under Federigo Zuccaro in Rome. He was a bold and correct draughtsman, a skillful anatomist, and a master of color and composition. His best picture is "The Last Supper," in the cathedral of Cordova, of which he became canon in 1577. He wrote several works on art, including a poem on the art of painting, and a learned work entitled *Comparación de la antigua y moderna pintura y escultura* (1601).

CÉSPEDES Y BORGES, thās′pā-dās ē bôr′-hās, Carlos Manuel de (1819-74). A Cuban patriot. He was born at Bayamo, in the Province of Santiago de Cuba, and studied at the universities of Havana, Barcelona, and Madrid. In Spain he became involved with Prim in a conspiracy to overthrow the Government, and was compelled to flee. After traveling for some time on the Continent, he returned to Cuba and began the practice of law, publishing at the same time a play and minor poetical pieces. As early as 1852 he suffered imprisonment for his revolutionary sentiments, and he was the leader of the revolt which broke out in 1868. On October 10, 1868, he proclaimed the independence of Cuba at Yara, and, with an army of some thousands, took possession of Bayamo. In January, 1869, he was forced to retreat to Guaimaro, where the republic was formally organized, April 10, 1869, and he was elected President. After 1870 his popularity waned rapidly, and in 1873 he was deposed by the Cuban Congress. He perished the next year; whether slain by his own servant or Spanish soldiers is uncertain.

CESS. See Land Tax.

CES′SIO BONO′RUM (Lat., surrender of goods). In the Roman law and under the modern systems derived from it, a process of voluntary bankruptcy whereby the debtor is permitted to escape the more painful personal and public consequences of insolvency by making a full and free surrender of all his goods, or of all his property, real and personal. In the Roman law the consequences thus averted were comprehended under the term infamy (*infamia*), by which was meant the loss of certain civil rights—as the capacity to hold office, to act as guardian or trustee, and the like. In the Scotch law, a *cessio bonorum* operates to relieve the debtor from the liability to arrest and imprisonment for debt. This indulgence is granted upon petition by the debtor setting forth the fact of his insolvency and his willingness to surrender his property to his creditors. If it appear, on hearing, that the indebtedness is legitimate and the application free from fraud, a decree of *cessio bonorum* is made, and this operates as an assignment of the debtor's estate to a trustee for the benefit of the creditors at large. As a general thing, a *cessio bonorum* does not, however, operate, like a decree in bankruptcy, to absolve the debtor from his liabilities, but is analogous in its results to the proceedings in insolvency common to most of the United States. See Bankruptcy; Insolvency.

CESSION (Lat. *cessio*, surrender, from *cedere*, to yield). In international law, the formal transfer of territory by one State to another. It may be the result of a gift, or of a sale, or of the fortunes of war. Most cessions have been forced from the ceding States as conditions of peace. The effect of a cession of territory upon the civil and political rights of the inhabitants of the ceded territory is generally determined by the treaty under which the transfer is made. In the absence of special stipulations on the subject, the inhabitants of the ceded territory change their allegiance from one sovereignty to another as soon as the transfer is complete; but the old laws continue in force until abrogated or changed by the new sovereign. The relations of the people to each other and their titles to property are not affected by the cession. A State which is forced to cede a part of its territory is not bound to indemnify its citizens who may suffer a loss of property by the cession. See Conquest. Consult: Lawrence, *Principles of International Law* (3d ed., Boston, 1900); Kent, *Commentaries on American Law* (12th ed., Boston, 1873).

CESSPOOL (more correctly *sess;* dialectic Engl. *suss, soss*, puddle, from Gael. *sos*, coarse mixture). A well or pit, often inclosed by masonry or wood, for the reception of sewage and drainage from dwellings. Cesspools should be made water-tight and emptied at stated intervals. Sometimes, however, they are connected with a blind drain through which the liquid will soak into the soil. A sink-hole or leaching cesspool has its bottom or sides so constructed that the contents soak readily into the soil.

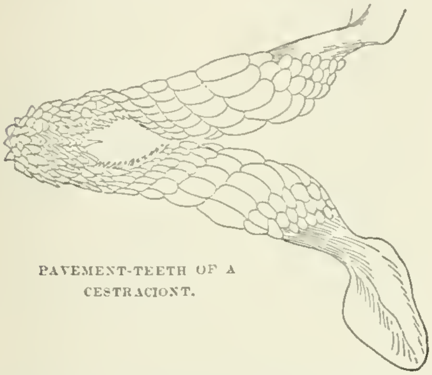
CESTI, chās′tā, Marc′ Antonio (1620-69). An Italian dramatic composer, born in Arezzo.. He studied under Carissimi, and became *maestro di cappella* to Ferdinand II. and assistant kappelmeister to the Emperor Leopold I. His operas were uniformly successful, but only *La Dori* (1663) and *Il pomo d'oro* (1666) have come down to us. A number of his cantatas have been preserved, but they are important chiefly for having been the first cantatas performed on the stage. He died in Venice.

CESTIAN BRIDGE. An ancient bridge at Rome joining the island of Æsculapius with the Trastevere, or Janiculan bank of the Tiber. It was built by Lucius Cestius, a prefect of the city, in B.C. 46, and restored by the Emperor Gratianus in 370 with material taken from the Theatre of Marcellus. Two modern arches were added when the bed of the river was widened in 1889; only the middle arch is ancient. It is now called the Ponte di San Bartolomeo, from the neighboring church of that name.

CES′TIUS, Pyramid of. A Roman tomb of the Augustan Age, near the Porta San Paolo, Rome. It is a unique imitation of Egyptian models. The exterior form is perfectly preserved, the pyramid rising 116 feet from a base 96 feet square. It is built of concrete, faced with slabs of white marble, and rests on a base of travertine. In the centre is a small sepulchral chamber whose surface of stucco was decorated with paintings of female figures and ornamental scrolls, quite perfect when the tomb was discovered and opened in 1663. The name and circumstances of Gaius Cestius, who was buried here, are given in inscriptions, but he is otherwise unknown.

CESTO′DA (Neo-Lat., variant of *Cestoidea*, from Gk. κεστός, *kestos*, girdle + εἶδος, *eidos*, form). A subclass of Platodes (flatworms) consisting of tapeworms and similar endoparasites, without cilia, without intestine, but with numerous testes, ovaries, and one or two yolk-glands. Cestodes are very widely distributed, but especially abundant in warm climates. They occur as intestinal parasites in species of all the classes of vertebrates, especially mammals, but the complete life history is known for comparatively few species. The group contains two orders, the *Monozoa*, unsegmented individuals (rare), and the *Polyzoa*, segmented tapeworms. For structure, habits, and effects upon the system of the host, see TAPEWORM.

CESTRACIONT, sĕs-trā′shĭ-ŏnt (Neo-Lat., from Neo-Lat. *cestracion*, from Gk. κέστρα, *kestra*, weapon, from κεντεῖν, *kentein*, to prick). A shark of the family Cestraciontidæ, whose three or four living species are chiefly interesting because they represent the oldest fossil sharks known, whose remains begin to be found in the Devonian, and in the Carboniferous become numerous and of larger size than the existing cestraciont. Thence the race declined somewhat, but may be traced to the present. They are known as pavement-toothed sharks, because the many teeth in the back of the mouth have a pavement-like arrangement. The surviving species are confined to the warmer parts of the Pacific Ocean, and are known as Port Jackson sharks. None exceed 5 feet in length, and they are distinguished by having two dorsal fins, in front of each of which is a strong, sharp spine, now smooth, but in fossil forms variously sculptured. The best-known species is the nurse-shark (*Cestracion philippi*). Little is known of their habits, but they are believed to subsist mainly on mollusks, whose shells are crushed between the 'pavements' of teeth. See Colored Plate of FISHES OF THE PHILIPPINES.



PAVEMENT-TEETH OF A CESTRACIONT.

CESTRO′TUM (Lat., from Gk. κέστρον, *kestron*, graving-tool, from κεντεῖν, *kentein*, to prick). A species of encaustic painting (q.v.) on horn or ivory, the lines of the design being burned in with the *cestrum* or burning needle, and wax introduced in the furrows thus made.

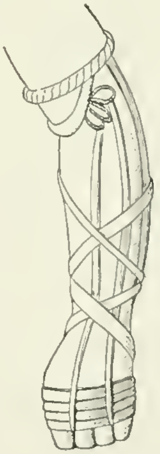
CES′TRUM (Lat., from Gk. κέστρον, *kestron*, graving-tool, from κεντεῖν, *kentein*, to prick). The implement or spatula employed by the ancients in the two kinds of encaustic painting: viz., wax and ivory encaustic. The cestrum was made of ivory, one end pointed, the other end flat. See ENCAUSTIC PAINTING.

CESTUI QUE TRUST, sĕs′twē̇ ke *or* sĕt′wē̇ (OF., he whom the trust). The technical legal term for the one for whose benefit a trust exists; the person who has the beneficial interest, as distinguished from the legal estate in lands or goods; the beneficiary of a trust. Compare CESTUI QUE USE, and see TRUST.

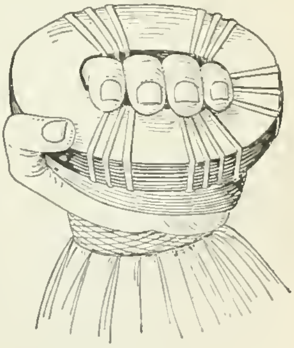
CESTUI QUE USE (OF., he whom the use). In English law, the person to whose use—i.e. for whose benefit—another holds the fee of lands or tenements. The term is nearly identical in meaning with the modern term *cestui que trust* (q.v.), and will be more fully explained in connection with uses and trusts.

CESTUI QUE VIE, vē (OF., he for whose life). In the English and American law of real property, a person whose life is the measure of the duration of an estate. A life estate, which was the characteristic estate of the early feudal law and is still of common occurrence, may be granted to one for his own life, or for the life of another, or even for the lives of several others. Thus, if a man by his last will devises lands to his daughter to have and to hold during the life of the mother, the latter, though having no interest in the estate, is known as the *cestui que vie*. So, also, if a life tenant of an estate for his own life conveys the same to another, he thereby steps into the position of a *cestui que vie*. His life continues to be the measure of the estate, notwithstanding it is now held and enjoyed by another. When the *cestui que vie* dies the estate comes to an end. See LIFE ESTATE.

CES′TUS (Lat., from Gk. κεστός, *kestos*, girdle, from κεντεῖν, *kentein*, to prick, to stitch). In Homer *cestus* is an epithet of a magic band (it does not seem to be a girdle) which Hera borrows from Aphrodite when anxious to lure Zeus to her side. The later writers sometimes use the word to denote a girdle. *Cestus* (or, more correctly, *cæstus*, from the Lat. *cædere*, to slay) is also the name of the covering for the hands worn by Roman pugilists. Among the Greeks until about B.C. 400, pugilists wound long bands of soft leather about the fingers and hand to protect them from injury. By degrees this protection became a means of offense, as the leather thongs were made thicker and harder, and finally became a formidable weapon, as is shown, e.g. on the fine bronze statue of a seated pugilist now in the Museo delle Therme in Rome. In still later times the heavy leather thongs were further strengthened by metal bands,



CESTUS AS A PROTECTION.



CESTUS AS A WEAPON.

or even almost wholly replaced by metal. With such a weapon it is no wonder that we hear of serious injury and even death as a result of the pugilistic encounters.

CETACEA, sē-tā'shē-ȧ (Neo-Lat. nom. pl., from Lat. *cetus*, Gk. κῆτος, *kētos*, whale). An order of aquatic mammals, comprising the whales, dolphins, and porpoises. The members of this order, in becoming more perfectly adapted to an aquatic life, have abandoned the normal form, and assumed the outward form and much of the internal structure of fish. Their bodies are fish-like, with smooth skins. Their pectoral or fore limbs are reduced to paddles that perform the functions of the pectoral fins of fish: their pelvic or hind limbs have disappeared entirely, and the pelvis itself has become reduced to a pair of horizontal bones that are remnants of the ischia. The tail is provided with a horizontal caudal fin, and a posterior dorsal fin is usually present on the back. There are also important modifications in the vertebral column and skull. The order comprises three suborders: Archaeoceti, all extinct animals, with long snouts, forward nostrils, and heterodont teeth; Odontoceti, including several families and about 60 species, comprising the toothed whales, with porpoises, dolphins, belugas, killers, etc., of small size, and the huge sperm-whales; and Mystacoceti, with nostrils far back, and their jaws bearing whalebone instead of teeth, as in the whalebone whale. For detailed descriptions and habits, see articles on the different members of the order.

Fossil Cetacea. Fossil forms of the Cetacea are not common, and the evolution of the order cannot be satisfactorily traced. The earliest representative is the genus Zeuglodon, the only member of the suborder Archaeoceti. This genus appears in the Eocene rocks of Europe, North Africa, and North America, and its skull presents closer resemblances to the normal mammalian skull than are to be found in that of any other cetacean. Its teeth are of two kinds, conical simple incisors, and compressed serrated two-rooted molars. In the Miocene rocks are found the earliest Odontoceti or toothed whales, in which the skull tends to become asymmetrical and the teeth to multiply and become similar and conical; and in the Pliocene all the modern types of this suborder were evolved, although their mode of evolution is not known. In the Miocene there appeared also the earliest known members of the Mystacoceti, or whalebone whales, which were of much smaller size and which had longer necks than have their modern descendants. The evolution of the Mystacoceti from Odontoceti is indicated by the presence, in the fetal stages, of some genera of the former group, of rudimentary calcified teeth which soon drop out to be replaced, in the adult stages, by whalebone. The Tertiary deposits of Patagonia may be looked to for the discovery of interesting material bearing on the evolution of this aberrant group of mammals. See Physodon; Porpoise; Dolphin; Squalodon; Whale; Zeuglodon.

CETEWAYO, kĕch-wä'yō. See Zululand.

CETINA, thā tē'nȧ, Gutierre de (?-c.1560). A Spanish lyric poet. Little authentic is known of him beyond the fact that he served in the army at Pavia, in Tunis, and in Flanders, and obtained the patronage of the Prince of Ascoli. He was a member of the Italianizing school, and wrote in the smaller verse-forms. His work was little known until all of it supposed to be extant was collected by de Castro in the *Biblioteca de autores españoles* (Vol. XXXII., Madrid, 1854). Some previously unpublished burlesques appeared in Gayoso's *Ensayo de una biblioteca española* (Vol. II.). Translations of a number of specimens may be found in the collection *Blüten spanischer Poesie*, by Hoffmann (3d ed., Magdeburg, 1856).

CETINJE, chĕ-tē'nyȧ. The capital of Montenegro and residence of the Prince and the higher secular and ecclesiastical authorities of the principality (Map: Balkan Peninsula, B 3). It is situated at an altitude of nearly 2000 feet, in a deep valley surrounded by mountains. In its general appearance it looks more like a village than a capital of a country. Even the palace of the Prince is an unpretentious, one-story house. The town has an old monastery, a number of institutions for secondary education, including a girls' institute, and a theatre. The population numbers about 4000. The town was destroyed by the Turks in 1683, 1714, and 1785.

CETOT'OLITH (from Gk. κῆτος, *kētos*, whale + οὖς, *ous*, ear + λίθος, *lithos*, stone). The fossil ear-bone of a whale. Cetotoliths are often found in the Tertiary deposits of Europe and North America, and in many parts of these formations they are the only remnants of the skeletons of whales that have been preserved. This is due to their harder consistency, which is greater than that of the rest of the skull and bones. See Cetacea; Whale.

CETRA'RIA. See Iceland Moss.

CETTE, sĕt. A seaport town and fortress of the third class, in the Department of Hérault, France, on a neck of land between the lagoon of Thau and the Mediterranean, about 25 miles southwest of Montpellier (Map: France, K 8). The town is entered by a causeway raised above the Thau lagoon, and a bridge of fifty-two arches. The main features of its fortifications are the redoubt of Claire and the forts of Saint Louis and Saint Pierre. The space inclosed by the piers and breakwaters forming the harbor is about 30 acres, and the depth is of from 16 to 19 feet. A broad, deep canal, lined with excellent quays, connects the port with the lagoon of Thau, and so with the Canal du Midi and the Rhone, thus giving to Cette an extensive inland traffic; it has likewise an active foreign commerce and is, next to Marseilles, the most important French port on the Mediterranean. The principal trade is in wine, brandy, salt, dyestuffs, perfumery, and verdigris. Cette has ship-building yards, large cooperage works, manufactures of chemicals and perfumes, and fisheries of oysters and anchovies. Population, in 1901, of town, 31,946; of commune, 33,246.

CETTIGNE. See Cetinje.

CE'TUS (Lat., from Gk. κῆτος, *kētos*, whale). One of the constellations. Among its stars is a very remarkable variable called θ Ceti. It has been named Mira (the wonderful), on account of its extraordinary changes of luminosity. Since 1596, when its variability was first discovered by Fabricius, it has blazed up sufficiently to be visible to the unaided eye once in about eleven months. It usually remains visible a number of days, and then sinks again into the comparative unimportance of a telescopic star of the ninth magnitude.

CEULEN, kē'len, CORNELIS J. VAN (1594-1664). A Dutch painter, born in London. His earlier work shows the influence of Van Dyke, but after returning to Holland his style became more individual, and his portraits, though a trifle monotonous, are well drawn. His finest picture is at The Hague: "The Magistrates of the Town Seated Around a Table." There are portraits by him in Paris, Berlin, Dresden, and London, and many in Holland.

CEUTA, thā'o͞o-tä. The chief Spanish penal settlement or presidio, on the northern coast of Africa, situated on a small promontory in Morocco, about 17 miles south of Gibraltar (Map: Africa, D 1). It is well fortified by a citadel and several batteries and is comparatively well built. It has a cathedral, and is the seat of a bishop, and administratively belongs to the Province of Cadiz. Its harbor is small and unprotected. The population (1900), 13,843, is composed of Spaniards, Moors, Negroes, and Jews, and includes a considerable number of convicts. Ceuta is of Roman origin. It passed in 1415 from the Moors to the Portuguese, and in 1580 was annexed with all the Portuguese territories to Spain, in whose possession it has since remained.

CEVA, chā'vä, TOMMASO (1648-1736). An Italian mathematician and poet, born in Milan. His *De Natura Gravium* (1669) was the first exposition of Newton's law of gravitation published in Italy. He invented an instrument for the trisection of angles, and published valuable investigations in his *Opuscula Mathematica* (1699). His poem *Puer Jesus* (1699; edited by Broxner, 1842), in epic manner, is of worth.

CEV'ADIL'LA. See SABADILLA.

CEVALLOS, thā-väl'lōs, PEDRO (1761-1838). A Spanish politician and diplomat, born in Santander (in the province of that name). He was educated in Valladolid, and appointed secretary to the embassy in Lisbon. In the confusion incident to Napoleon's interference in Spanish affairs, he took sides with the Crown Prince Ferdinand (afterwards Ferdinand VII.), whom he advised to arrange the interview with Napoleon at Bayonne. He was afterwards a member of the Junta of the Spanish insurgents, and acted as agent of that interest in London. In 1808 he published his *Exposition des faits et des trames, qui ont préparé l'occupation de la couronne d'Espagne*, descriptive of Napoleonic methods. He continued prominent during the struggle for independence, and was for a time a Cabinet minister under Ferdinand VII. He also held posts as Ambassador at Naples and Vienna.

CÉVENNES, sā'vĕn' (ancient Cebenna). The chief mountain range in the south of France (Map: France, K 7). Divided into two groups, the Northern and Southern Cévennes, they form the watershed between the river system of the Rhone on one side and those of the Garonne and Loire on the other. Their general direction is from northeast to southwest, commencing at the southern extremity of the Lyonnais Mountains, and extending under different local names as far as the Canal du Midi, where they approach the northern offsets of the Pyrenees. The central mass of the Cévennes lies in the departments Lozère and Ardèche, Mont Mézene (the culminating point of the chain) having an elevation of 5754 feet. The average height is from 3000 to 4000 feet. The masses consist chiefly of amphibolic rocks, graywacke, and limestone, covered with Tertiary formations, which in many places are interrupted by volcanic rocks. The Cévennes have been celebrated as the arena of religious warfare. They were the scene of the persecutions of the Albigenses (q.v.) and the Waldenses (q.v.) in the Middle Ages and of the Camisards (q.v.) in the Seventeenth Century. Consult: R. L. Stevenson, *Travels with a Donkey in the Cévennes* (9th ed., London, 1895); Ribard, *L'histoire cévénole d'après des documents* (Cazillac, 1898).

CÉVENOLE (sā've-nōl') **RACE.** A term applied by Deniker to the Celtic or Alpine short-headed type of Europeans, also called Occidental. The name is derived from the Cêvennes, in France, the locality of its most characteristic type. Consult Deniker, *Races of Man* (London, 1900).

CEYLON, sē-lŏn' *or* sī-lŏn' (Hind. *Silān*, Pali *Sihalana*, from Skt. *Simhala*, Ceylon, from *simha*, lion; Lat. *Taprobane*, from Gk. Ταπροβάνη, from Skt. *tamraparṇa*, copper-leaf, on account of the shape of the island, from *tamra*, copper + *parṇa*, leaf; the Skt. name of the island is *Lankā*). An island in the Indian Ocean, and a Crown colony of Great Britain, situated southeast of the Indian peninsula, from which it is separated by Palk Strait and the Gulf of Manar (Map: India, D 7). Its location is between latitudes 5° 55' and 9° 51' N., and between longitudes 79° 41' and 81° 54' E. It is almost pear-shaped, having a length of about 266 miles, and a width varying from 32 to 140 miles, with a total area of over 25,300 square miles.

PHYSICAL FEATURES. In its northern part, Ceylon is a level country, interspersed here and there with low hill chains. The southern part, on the contrary, is mountainous in its character. The mountain masses of the island cover an area of over 4000 square miles and run in various directions with a gradual decline toward the north. The highest peaks are Pedrotallagalla (8280 feet), and Adam's Peak (7420 feet), a famous place of pilgrimage among Oriental nations and especially held in high esteem by the Buddhists. Geologically the northern part of Ceylon shows a predominance of coral limestone, while the prevailing composition of the mountains is gneiss occasionally intersected with veins of quartz and sometimes overlaid with clay or limestone. Ceylon has numerous rivers, mostly dependent on the rains for their water. The principal of them is the Mahavela-ganga, rising in the mountains in the vicinity of Adam's Peak and falling into the ocean near Trincomali Bay. It is quite deep and even navigable for a short distance during the rainy season, but is easily forded in the dry season. There are ancient remains of dams and canals which formerly connected extensive lagoons along the east coast.

The climate of Ceylon, although superior to that of most tropical countries, is still sufficiently unhealthful, especially in the low regions, to prevent European immigration on a large scale. In some parts of the island there is practically only one season, a humid and oppressive heat interrupted now and then by copious showers. The average annual temperature ranges from about 70° to 90°, in accordance with the altitude of the locality. In the mountains the temperature is pleasantly cool and not infrequently cold in the night. In the valley of Nurwara-Eliya, situated at an altitude of nearly 6000 feet and used for a sanatorium, the temperature seldom rises above 70° and has an annual average of about 62°. The rainfall shows as much diversity as the temperature, ranging from 30 to 80, and sometimes 120 inches per year.

The flora of Ceylon is remarkable for its beauty as well as for its variety, and constitutes one of the principal attractions of the island. It is especially rich in palms, of which the most prominent specimens are the cocoanut, areca, and feathery palms. The elevated portions of the island were formerly covered with thick forests of valuable trees, some of which cannot be found elsewhere in the world. Most of these forests are being destroyed to make way for the extensive tea plantations, which now constitute the most prominent feature of the island. Ceylon is also especially rich in ferns and flowers, of which there are endless varieties.

The animal kingdom of Ceylon is also remarkable for its variety. Chief among the quadrupeds is the elephant, which, although tuskless, is of much value as a beast of burden, and is largely exported from the island. The bear, leopard, buffalo, several species of the monkey, and the Indian humped ox are also abundant. The island contains over 3000 species of birds and many varieties of reptiles, among which the most prominent is the crocodile.

AGRICULTURE is the chief industry of Ceylon as well as the main source of its prosperity. Of a total of over 16,000,000 acres covered by the island, an area of about 3,000,000 acres, or about 19 per cent. is under cultivation and pasture. Of these, about 750,000 acres are under rice and grain, 19,000 acres under coffee, over 400,000 acres under tea, about 860,000 acres under cocoanuts, and 33,000 acres under cacao. The cultivation of grain and cocoanuts receives but scant attention from foreign settlers, who are the principal owners of the large tea plantations to which the island owes its importance. The cultivation of tea in Ceylon is of comparatively recent origin, the first plantations having been established by Europeans in the latter part of the Nineteenth Century after the failure of the coffee plantations. The tea plantations, of which there are about 1000 at present, are situated mostly in the mountain regions of the central province, some of them lying as high as 7000 feet above the sea. Owing to the reluctance of the Singhalese to work on the tea plantations (a reluctance due partly to their satisfaction with their present condition and partly to their mistrust of foreigners), the tea-planters depend for their labor on imported coolies, who come over to the island with their families, and after a stay of several years generally return to India. Of a total of about 400,000 people engaged on the tea plantations, only a small fraction consists of Singhalese, but their proportion is gradually increasing. The rapid development of the tea industry is best shown by the increase in the exports of the commodity. In 1873 there were exported from the island 23 pounds, which increased to 100,000 pounds in 1879 and 2,392,975 pounds in 1884. In 1895 it reached 98,581,060 pounds, while in 1899 it amounted to nearly 130,000,000 pounds. This astonishing advance may be partly accounted for by the fact that many of the tea plantations occupy the sites of the former coffee plantations, and thus had the advantage of a prepared soil. The coffee industry, introduced first by the Dutch and afterwards taken up by the British settlers, enjoyed an artificial prosperity until after the middle of the Nineteenth Century, when it was almost completely destroyed by disease of the plants, and has been gradually declining since then. Cinnamon, tobacco, and cinchona are also cultivated to some extent. The areca-palm yields the areca-nut. Of minerals, Ceylon has some iron, and extensive deposits of graphite, which constitutes one of the staples of the island. Gem-quarries are also worked extensively, and the pearl-fisheries are a State monopoly.

Under British occupation, the commerce of Ceylon has made considerable progress. The value of the total commerce for 1899 was about Rs. 224,000,000, divided equally between imports and exports, while in 1892 it amounted only to about Rs. 133,000,000, the imports exceeding the exports by about Rs. 9,000,000. The trade is chiefly with Great Britain and India. The exports and the imports of the former to and from Ceylon, for 1899, amounted to Rs. 31,500,000 and Rs. 61,000,000 respectively, while India exported to Ceylon about Rs. 67,000,000 worth, and imported only about Rs. 5,300,000. The chief exports are tea, cocoanut products, spices, and graphite. The imports consist chiefly of cotton goods, rice and grains, coal, and beverages. The total direct commerce of the United States with Ceylon for 1899 amounted to a little over $4,600,000, of which over $4,500,000 represented imports into the United States. The three principal ports of the island are Colombo, the capital, Galle, and Trincomali. The first named, while less favored by nature than the other two, is the chief port, and its harbor, improved by the construction of the gigantic breakwater, now admits the largest vessels. The total tonnage entered and cleared at Ceylon ports in 1899 was 7,439,205. The railway lines of the island have a total length of 297 miles and are almost entirely owned and operated by the Government.

ADMINISTRATION. Ceylon has been administered since 1831 by a Governor assisted by an executive council of five members (all Government appointees) and a legislative council of seventeen members, including the members of the executive council and four other Government officers, while the rest represent the native and the foreign elements of the island. For administrative purposes Ceylon is divided into nine provinces, each administered by a Government agent. The code of the colony is a modification of the Roman-Dutch law, while the criminal law is based on the Indian Penal Code. Justice is administered by a supreme court, police, and district courts, and courts of request. Minor cases are dealt with by the village councils. The budget of the island has increased from about Rs. 21,000,000 to Rs. 26,000,000. The chief sources of revenue are customs, licenses, monopolies, and railways. The chief items of expenditure are administration, public works, service of the debt, military forces, and fortifications and pensions. The foreign public debt amounted at the end of 1899 to £3,445,840, and the local silver debt to Rs. 3,253,191. Public instruction is in charge of a special department presided over by a director assisted by a staff of inspectors. The total number of schools in 1899 was 3640, with a total attendance of over 193,000, or a little less than 6 per cent. of the total population. Of the total number of schools, 489 were maintained by the Government, 1263 received grants in aid, and 1887 were unaided. Among the educational establishments of the island there are two colleges, one agricultural school, and one school of forestry, and a number of industrial schools.

INHABITANTS. According to the census of 1901, the total number of inhabitants of Ceylon, including all races, was 3,576,990. The two principal races are the Singhalese and the Tamil. The Singhalese form about two-thirds of the native population and they live in the southern and south central portion of the island. They are the descendants of colonists from the valley of the Ganges who first settled on the island during the Sixth Century B.C. In their customs, costume, and general appearance, they have remained unchanged since the days of Ptolemy. The dress of the men, who have delicate features and slender limbs, is singularly effeminate, and consists of a comboy, fastened at the waist and hanging straight to the ankles in a manner very much resembling a white cotton petticoat, while a jacket of white linen or duck covers the upper part of the body. Their long hair, turned back from the forehead, is confined with combs, and earrings are worn by way of ornament. The women, in addition to the comboy, cover the upper part of the figure with a white muslin jacket, and adorn themselves with necklaces, bangles, rings, and jewelry. The Singhalese are Aryans by language, but in blood they are somewhat mixed, though fundamentally of the white race. The Kandyans, or Highlanders, are a sturdy race, and maintained their independence for centuries after the conquest of the low country by European settlers. They keep up more of their ancient customs than the coast Singhalese. Polyandry, which was formerly universal, still lingers among them, and is an ancient usage to which they strongly adhere. The Malabars, or Tamils, are of Dravidian stock and are sprung from those early invaders of Ceylon who from time to time swept across from southern Hindustan, and contended with the Singhalese kings for the sovereignty of the island. The Moormen, so called by the Portuguese, are the most energetic and intelligent of the native communities, and are met with in every province as enterprising traders. They are a very distinct race from the Singhalese, but have no tradition of their origin. Europeans generally believe them to be of Arab descent, but Tennent is of the opinion that "they may be a remnant of the Persians, by whom the island was frequented in the Fourth and Fifth centuries." The Tamils are largely devotees of Hinduism, while the Singhalese are Buddhists: Ceylonese Buddhism, indeed, is the most vigorous branch of that faith.

The 'burghers' are a people of European descent, who have become naturalized. Those of Portuguese extraction hold the lowest place, and are mostly tradesmen and artisans; but the Dutch burghers frequently fill responsible posts, and are employed in the Government offices.

The aboriginal inhabitants of the country are represented by the Veddas, a people occupying one of the lowest stages in human culture at the present time. They number about 3000, and occupy a district in the eastern part of the island, where they have preserved their ancient customs and manner of living for more than 2000 years. They appear to have little religion, although they recognize gods, as Wilhelm Geiger's investigations have shown. The tribe is divided into the Coast Veddas, Rock Veddas, and Village Veddas. The Coast Veddas are a little more civilized than the others. The Rock Veddas hide themselves in the jungle, live by the chase, and sleep in trees or caves. They use fire to cook their meat, and their greatest gastronomic treats are the iguana lizard and roasted monkey. The village Veddas locate themselves in the vicinity of European settlements on the eastern coast, living in rude huts of mud and bark, and are hardly more civilized than their brethren of the jungles. The exertions of the Government to reclaim this shy and harmless but degraded people have in some degree succeeded.

LANGUAGE AND LITERATURE. The Ceylonese, Singhalese, or Sinhalese is a modern Indian dialect spoken in the south of Ceylon, while a Dravidian dialect, the Tamil, is the language of the northern part of the island. The Singhalese is allied most closely to the Māhārāshtri Prakrit, and the Pali, the most important Middle Indian dialects, and it seems to have come from the northwest of India. The Singhalese differs more from the Prakrit and Pali than is the case with most of the modern Indian dialects. The change of vowels on account of a following *u*, or *i* ('umlaut'), the entire loss of the aspirates, and the change of *c* to *s*, and of *j* to *d*, while *s*, whether original or developed, may become *h* or remain unchanged, are noteworthy characteristics of this dialect. In its nominal system Singhalese has become analytic, like the other modern Indian dialects, but in its verbal system it represents a comparatively old stage of linguistic development. There was formerly much discussion whether Singhalese was an Indian or a Dravidian language. It is now, however, generally regarded as a true Aryan dialect, despite the many loan-words which have been incorporated into its vocabulary. The older form of Singhalese is called Elu, which is still employed for poetical composition. Dialects of the Singhalese are Maldive, and the patois of the Veddas, as well as the jargon of the Rodiyas, which seems to be a slang of the standard language. Singhalese is written in a special, graceful character, apparently derived, like the epigraphical letters, from the Brahmī alphabet of the Asoka inscriptions.

Singhalese literature is rather scanty. The oldest monument of it is a glossary to the commentary on the Dhammapada in the Tenth Century. The prose literature is chiefly religious, but there are also grammatical works, such as the *Sidat-sangarāva*, and, what is especially noteworthy in Indian literature, histories, such as the *Dipavansa*. The golden period of Singhalese poetry was in the Fifteenth Century, when the *Sälalihini-sandeśaya* was written. Many of the poems deal with the Buddhist birth-stories, or Jātakas, as the *kusajātaka* of Alagiyavanna Mohottāla or Mukaveti, a poet of the Singhalese Renaissance at the beginning of the Seventeenth Century. There are many inscriptions in Singhalese, dating from the last centuries B.C. to the Nineteenth Century A.D. After the Fifth Century, however, they are comparatively infrequent.

RELIGION. The prevailing religion of Ceylon within historic times has been Buddhism; it is still the faith of almost the entire southern and central portions, or two-thirds of the island. Hinduism, or the sects of Brahmanism, is confined chiefly to the north. Christianity and Mohammedanism have a considerable representation throughout the land. The census of 1891 gives the following statistics: Buddhism, 1,877,043; Hinduism, 615,922; Christianity, 302,127; Mohammedanism, 211,955. Singhalese Buddhism is the principal representative of Southern Buddhism, which includes also Siam and Burma, in contrast to the Northern Buddhism of China, Japan, and Tibet. All have their origin, of course, in India. (See BUDDHISM and INDIA.) The history of the faith as a national religion in Ceylon is reserved in the Pali chronicles of Ceylon, the *Mahāvansa* and the *Dīpavansa*. Tradition claims that Buddha himself visited the island (Lankā) on three different occasions. His sacred footprint, the *srīpada*, on Adam's Peak (q.v.), is still a place of hallowed pilgrimage for the faithful. The real introduction of Buddhism into Ceylon, however, dates from the Third Century B.C., when Mahinda came from India and established the faith under the patronage of King Tissa of Ceylon, a contemporary of the great Asoka (q.v.). Mahinda's own sister, the Princess Sanghamitta, brought from Buddha Gayā a branch of the sacred Bo-tree, or *Ficus religiosa*, from which the famous tree at Anurādhapura is directly descended. (See BO-TREE.) The faith thus established entered upon its history in the island. In the Fourth Century A.D. the great Buddhist scholar and commentator, Buddhaghosa, came from India to Ceylon, and by his admirable treatise on the Buddhist doctrines, the *Vissuddhi-magga*, or Way of Purity, set up a standard of interpretation of the sacred texts which has been authoritative since his time. Under Parkākrama Bāhu I., the greatest Buddhist of Ceylon, c. 1200 A.D., was the time of the highest prosperity of the faith; but a depression, more or less great, followed later, and Brahmanism, which had contributed more than one admixture from the earliest Tamil invasions and the rule of the Malabar kings, proved a formidable rival. In spite, however, of all opposing claims, including Mohammedanism and Christianity, the title of Buddhism is still paramount, and it has been kept practically free from sects. Three divisions or societies, however, are recognizable. The largest of these in point of numbers, some 50 per cent., and the earliest to develop, is a division due to the influence of Siamese monks who were imported into the Kandyan territory, about A.D. 1750, to restore decadent Buddhism. The second, or Amarapura society, was founded about A.D. 1800, when Buddhist missionaries from Burma were introduced. The third, or Ramany branch, represents a somewhat reactionary movement or tendency to stricter conformity to the faith of the ancient books. Only the Siamese society cultivates caste; the other two reject it as foreign to Buddhism, although of ancient origin. There are some other slight points of distinction between the three. In this connection it may be worth noting that Christianity has taken hold largely among the fishermen class, who are regarded as among the lowest orders of the community. Hinduism, or Brahmanism, for the most part is the faith of the Tamil or Malabar population of Ceylon; the Moormen are Mohammedans. The first Protestant missionaries that went to Ceylon after the Portuguese and the Dutch supremacies had given place to the British, were sent by the Baptists in 1813; the Wesleyan Methodists followed in 1814; the American missionaries entered the field in 1816; and the Church of England came in 1818. The progress of Christianity among the people has been very considerable; schools have been established; female seminaries endowed; and collegiate institutions founded, especially under the guidance of missionaries.

ANTIQUITIES. The buried cities and ruins of massive monuments in Ceylon make its antiquities a subject of importance to the student of art, archæology, and history. These vestiges of early civilization are directly connected with Buddhism as the national faith of the island. In all Buddhist countries the sacred buildings present, with certain modifications, the same general character (see articles BUDDHISM; BURMA, etc.), and in Ceylon we find the usual three classes represented by temples (*pansalas*), monasteries (*vihāras*), and relic shrines (*dāgabas*). The latter, from *dā*, *dhātu*, relic, and *gaba*, *garbha*, receptacle, denotes a casket, and then a large structure erected to contain some sacred relic of Buddha. The form of these is bell-shaped, on a square base. They answer in general to the pagodas of Burma and the topes of Afghanistan. The most famous of the dāgabas in Ceylon is the Daladā Māligava, the Temple of the Tooth, at Kandy, containing a tooth of Gautama Buddha brought from India to Ceylon about A.D. 300. The original relic was destroyed by the Portuguese, but its substitute, a piece of discolored ivory resembling a crocodile's tooth, is jealously guarded in a sacred shrine and shown only to royal personages or on the rarest occasions. The labor which must have been bestowed upon some of these shrines and edifices in the early ages of the Singhalese monarchy is astonishing. Some of the ruined structures in the half-buried cities of the north of the island almost rival the pyramids of Egypt or other monuments of antiquity in their desolate grandeur. The architectural remains of 2000 years ago, as seen at Anurādhapura, Polonnaruwa, Dambulla, Kalavewa, Mahintale, and Sigiri are of the greatest interest alike to the traveler and to the antiquarian. The rock-hewn temple of Gal-vihāira at Polonnaruwa, the capital of ancient Ceylon, is much the same to-day as it was when described in the *Mahāvansa*. The massive pile of the Rankot Dāgaba and the Jetavanārāma Temple, in the same region, with the colossal statues of Buddha here and elsewhere, well repay a visit after Anurādhapura, with its famous Bo-tree alluded to above. Among the antiquities of Ceylon the ruined tanks must also be mentioned, as they are wonderful monuments; 30 enormous reservoirs and about 700 smaller tanks still exist, though for the most part in ruins. Something has been done toward restoring these magnificent works of irrigation.

HISTORY. There are abundant allusions to Ceylon in ancient writers, and the island appears in early Sanskrit works under the name of Lankā; but no direct knowledge concerning its history was accessible in Europe until about the year 1826. The opening up of the records of

Ceylon's early history was due to the labors of George Turnour (1794-1843), who devoted himself to a study of the Pali chronicles, and composed an *Epitome of the History of Ceylon* from the year B.C. 543 to A.D. 1798. His records give the reigns of 165 kings who reigned during this period of 2341 years. He based his work chiefly on the most famous of the Singhalese books, the *Mahāvansa*, a metrical chronicle, in the Pali language, which gives an account of the island during the above twenty-three centuries. The story begins with the invasion of Vijaya, or Wijayo (B.C. 543), son of a petty Indian sovereign in the country watered by the Ganges. He subdued the Yakkhas, the aboriginal inhabitants; married a daughter of one of the native chiefs, whom he subsequently repudiated for an Indian princess; and founded a dynasty that held undivided sovereignty in Ceylon for nearly eight centuries. He bestowed on his kingdom his patrimonial name of Sīhala, or Sinhala—whence Sinhalese (Singhalese), Ceylon—and promoted the settlement of colonists from the mainland. In the reign of the great King Tissa, called Devānāmpiyatissa, or Devenipiatissa (B.C. 307), Buddhism was established as the national religion, and his reign was further remarkable by the planting of the sacred Bo-tree (B.C. 288): and now commenced the erection of those stupendous buildings already noticed. The next important epoch in Singhalese history is the usurpation of the Malabars (B.C. 237), foreign mercenaries from the Coromandel coast, to whom the native sovereigns had intrusted the defense of the island. Several Malabar invasions are chronicled in the history of Ceylon, and these foreigners long contended with the native princes for supreme authority. Passing on to A.D. 1071, a native dynasty was then reëstablished in the person of Vijaya Bāhu, and his recovery of the throne delivered the country from the domination of the Malabars or Tamils for a time, and prepared the way for the restoration of the royal race nearly a century later in the person of the illustrious Parākrama Bāhu. Parākrama's reign commenced in A.D. 1153, and it was one of the most renowned eras in the history of Ceylon. He devoted himself to religion and agriculture, and besides many notable religious edifices; he caused no fewer than 1470 tanks to be constructed, subsequently known as the 'seas of Parākrama.' Thirty years after the death of this monarch, the Malabars landed with a large army and speedily conquered the whole island. In 1235 a native dynasty recovered a part of the kingdom. During the reign of Dharma Parākrama IX. the Portuguese first visited Ceylon (1505); but it was in 1517 that they first formed a permanent settlement at Colombo for trading purposes. Their encroachments soon aroused the opposition of the patriotic Kandyans, and it is a remarkable fact that, although they were even ignorant of the use of gunpowder when the Portuguese came, in 1505, they ultimately excelled their enemies as musketeers, and were finally able to bring 20,000 stand of arms to bear against them. 'Amity, commerce, and religion,' was the Portuguese motto: but their rule in Ceylon is a sad story of rapacity, bigotry, and cruelty. They were at last driven from the island by the Dutch in 1658, after a contest of twenty years, when, as Sir J. E. Tennent remarks, "the fanatical zeal of the Roman Catholic sovereign for the propagation of the faith was replaced by the earnest toil of the Dutch traders to intrench their trading monopolies; and the almost chivalrous energy with which the soldiers of Portugal resisted the attacks of the native princes was exchanged for the subdued humbleness with which the merchants of Holland endured the insults and outrages perpetrated by the tyrants of Kandy upon their envoys and officers." But the purely military tenure of the Dutch was destined to give place to the colonization of the British. It was during the great European war succeeding the French Revolution that the English gained possession of the island. On August 1, 1795, an expedition under Col. James Stuart landed at Trincomalee, which was speedily captured, and finally the garrison of Colombo surrendered, on February 16, 1796. By this capitulation all the Dutch settlements and strongholds in Ceylon were ceded to the English, though the island was not formally annexed to the British crown till the Peace of Amiens, March 27, 1802. The native sovereigns, however, continued in the possession of their mountain territory; but at length the Kandyan king, Vikrama Rāja Sinha, after perpetrating the most frightful atrocities on his own people, seized and murdered certain native merchants, British subjects, trading to Kandy. War followed; in January, 1815, Kandy was taken, and the tyrant was sent a captive to the fortress of Vellore. On March 2, 1815, a treaty was concluded with the native chiefs, by which the King was formally deposed and his territories annexed to the British crown. Since then the island has made rapid strides in material prosperity; many important public works have been completed, and others are still in progress.

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CEYLON TEA-TREE. See ELÆODENDRON.

CEZIMBRA, sȧ-zēm′brȧ. A coast town of Portugal, in the Province of Estremadura, about 18 miles south of Lisbon (Map: Portugal, A 3). It has a good harbor and fisheries. Population of the commune, in 1890, 8138; in 1900, 9066.

C. G. S., or **CENTIMETER-GRAM-SECOND SYSTEM.** That system of units or standards for the measurement of physical quantities which is based upon the *centimeter* as the unit of length, the *gram* as the unit of mass, and the mean solar *second* as the unit of time duration.

It has been adopted by all scientific bodies, by most governments, and is in daily commercial use at the present time (1902) by all the leading nations of the world except Russia, Great Britain, and the United States.

The *centimeter* has a length which is the one-hundredth of that of a certain platinum bar kept in Paris, known as the *mètre des archives*, the length being measured when the bar is at the temperature of 0° Centigrade. Its abbreviation is 'cm.' The *gram* has a mass which is the one-thousandth of that of a piece of platinum kept in Paris, known as the *kilogramme des archives*. Its abbreviation is 'gm.' The mean solar *second* is an interval of time such that 60 × 60 × 24 of them compose a mean solar day—that is, the length of time such that 365 of them compose a year. The abbreviation of the second is 'sec.'

It should be noted that the meter is nearly one-ten-millionth of the distance from the pole of the earth to the equator, measured along any meridian on the earth's surface. Further, the gram has very exactly the same mass as one cubic centimeter of distilled water at 4° C. (its temperature of maximum density), and at normal atmospheric pressure, for the most accurate results give for this mass 0.99996 gram. A *liter* is the volume occupied by one kilogram of pure water at 4° and at normal pressure.

Various multiples and fractions of these units have received names. (See METRIC SYSTEM.) Thus, one thousand meters is called a *kilometer;* one-tenth of a centimeter a *millimeter;* one-thousandth of a millimeter a *micron*, whose abbreviation or symbol is 'μ'; one-thousandth of a micron, or one-millionth of a millimeter, has the symbol '$\mu\mu$.' The other divisions of the meter and those of the gram have the usual decimal names and notations. The words 'minutes,' 'hours,' etc., require no explanation. Units for the various mechanical quantities are based directly on the centimeter, gram, and second. Thus, a unit velocity on the C. G. S. system is a speed of one centimeter per second in a definite direction, etc. (See MECHANICS and MECHANICAL UNITS.) A unit force is called a *dyne;* a unit of energy an *erg;* but these units are inconveniently small, and so multiples of them are used in general. A *megadyne* is 1,000,000 or 10^6 dynes; a *joule* is 10,000,000, or 10^7 ergs. The practical unit of pressure is, therefore, 1 megadyne per square centimeter, and is called a *barie;* the practical unit of power or activity is 1 joule per second, and it is called a *watt.*

There are also several sets of electrical units (q.v.), based on these mechanical ones, as are also the ordinary units for measuring heat energy and photometric quantities. (See HEAT; and PHOTOMETRY.) Consult Everett, *Illustrations of the Centimètre-Gramme System* (London, 1875).

CHABANEAU, shȧ'bȧ'nō′, CAMILLE (1831—). A French philologist, born at Nontron, Dordogne. His first work, *Histoire et théorie de la conjugaison française* (1868), attracted considerable attention, and he afterwards became professor of the French language and literature of the Middle Ages at Montpellier, and collaborator in the *Revue des langues romanes* (1872). Among his works are: *Grammaire limousine* (1876); *La langue et la littérature provençales* (1879); and *Biographies des troubadours en langue provençale* (1885).

CHABAS, shȧ'bȧ′, FRANÇOIS JOSEPH (1817-82). A French Egyptologist. Though engaged in business as a wine-merchant throughout most of his life, at Châlon-sur-Saône, he became a leading authority on Egyptian archæology. In 1873 he declined the chair of Egyptian language and archæology in the Collège de France. Of his numerous publications, some of the most valuable are translations of hieroglyphic and hieratic writings. Among them are: *Le papyrus magique Harris* (1861); *Voyage d'un Egyptien en Syrie, en Phénicie et en Palestine au XIV. siècle avant notre ère* (1866); and *Recherches pour servir à l'histoire de la XIX. dynastie* (1873).

CHABASITE, kăb′ȧ-sīt. See ZEOLITE.

CHABLAIS, shȧ'blȧ′. An old division of the Province of Annecy, in Savoy, now the arrondissement of Thonon, Department of Haute-Savoie, France, bordering on Lake Geneva.

CHABOT, shȧ'bō′, FRANÇOIS (1759-94). A French Revolutionist, born at Saint-Geniez-Dol (Rouergue). Originally a Capuchin monk, he abandoned the order, and identified himself with the Revolutionary movements. He was elected to the Legislative Assembly in 1791, and to the Convention in 1792. He joined the Cordeliers Club, and became known as a violent extremist. It was on his motion that Notre Dame was made the Temple of Reason, and it was he who originated the designation 'La Montagne' for the rabid legislators occupying the topmost seats. Publicly accused by Robespierre, he was condemned with the Dantonists, and, after an unsuccessful attempt at suicide, was guillotined.

CHABOT, PHILIPPE DE, Seigneur de Brion and Comte de Charni (1480-1543). A French general and admiral. He defended Marseilles in 1524, and in 1525 was made prisoner at Pavia. On his release he was made admiral, and in 1535 commander-in-chief. In 1541 he was convicted of fraud against the national treasury, on charges preferred by the Constable Montmorency, but was pardoned by King Francis I. He was the patron of Jacques Cartier, the famous explorer, and is said to have been the first to suggest the colonization of Canada. He was known as the Admiral de Brion.

CHABRIAS, kā′brĭ-*as* (Lat., from Gk. *Χαβρίας*) (B.C. ?-357). An Athenian general, the son of Ctesippus. He was first made general in B.C. 390, when he took part in the Thracian expedition of Thrasybulus. From this time until his death, in 357, he was in almost constant service. In 388, while on his way to Cyprus to support King Evagoras against the Persians, he defeated the Spartans at Ægina. In 378, by bringing into operation a new manoeuvre—that of awaiting the charge of the enemy with one knee braced against the shield and the spear held in position for throwing—he compelled Agesilaus, who had invaded Bœotia, to withdraw without fighting. In B.C. 376 he defeated the Lacedæmonians at Naxos. At this time many islands and towns were brought, through his efforts, into the new Athenian League. In 373 he was general with Iphicrates, and in 369 he fought against the Thebans in Peloponnesus. In 367-66 he was charged with treason in connection with the seizure of Oropus by the Thebans, but was acquitted. In 357 he was trierarch at the battle of Chios, and was killed while fighting.

CHABRIER, shȧ'brē'ā', Alexis Emmanuel (1842-94). A French composer, born at Ambert. His first success was an operetta in three acts, *L'étoile* (1877). He next attracted attention as a symphonist in *España* (1883), a fine piece of instrumentation. *Gwendoline* (1886), another opera in three acts, was first sung in Brussels. His dramatic works include *Le roi malgré lui* (1887), *Briseïs* (1893), *Les muscadins*, and some symphonies, such as *Suite pastorale*, *Marche de cipayes*, and *Prélude et marche française*.

CHABRILLAT, shȧ'brē'yȧ', Henri Louis (1842—). A French dramatist and journalist. He was born in Marseilles, and in 1866 founded the journal *Le gamin de Paris*. After directing the Théâtre Ambigu Comique (1878-82), he returned to journalism and literature. His works include the following operettas: *Mazeppa* (1872); *La belle Bourbonnaise* (1874); *L'éléphant blanc* (1873); *Les trois margots* (1877); *La fiancée du roi de Garbe*.

CHACHALACA, chä'chȧ-lä'kȧ (onomatopoetic word). A guan of the genus Ortalis, of which several species exist between Venezuela and northeastern Mexico; specifically, *Ortalis vetula*, McCall's chachalaca of the Rio Grande Valley. See Guan.

CHACMA, chăk'mȧ (Hottentot). A baboon. See Baboon.

CHAC-MOOL, shăk'mōōl'. A name given by Le Plongeon to a statue which he discovered in 1876 in the uninhabited city of Chichen-Itsa, Yucatan, and which he supposed to be a representation of one of the olden chiefs, named Chac-Mool, of the Maya Indians. The statue now stands in the National Museum, Mexico; but the accuracy of Le Plongeon's conjectural christening of it is questioned.

CHACO, chä'kō, El. A Territory of Argentina, situated in the northeastern part of the Republic, and bounded by the Territory of Formosa on the northeast, the river Paraná on the east, the Province of Santa Fé on the south, and Salta and Santiago del Estero on the west and north (Map: Argentina, E 8). Its area is estimated at over 52,000 square miles. The surface is even, but sparsely watered. Population, in 1900, 12,197. The chief settlement is Resistencia, situated on the Paraná, near Corrientes, and connected by rail with Santa Fé, with a population of about 1200.

CHACO, El Gran. A name applied to a region of central South America extending northward from the Salado River to about latitude 18° S., and included between the Paraguay and Paraná rivers on the east and the foot-hills of the Andes on the west. It thus comprises a large part of northern Argentina and western Paraguay, and smaller portions of southeastern Bolivia and southwestern Brazil. The Chaco Boreal includes the section north of the Pilcomayo; the Chaco Central, the section between the Pilcomayo and the Bermejo; and the Chaco Austral, the section south of the latter river. The region is a vast plain, undulating in places, but for the most part flat, and sloping gently toward the southeast. Its mean elevation ranges from about 1000 feet on the western edge to 100 feet on the east. The large rivers which cross the Gran Chaco are subject to periodical freshets, and inundate vast areas of the low-lying ground. With the subsidence of the waters, numerous lakes and swamps are formed which may remain for a greater part of the year. These lowlands are covered with heavy forests, and with thickets of vines and bushes, while the more elevated areas support a luxuriant growth of grasses. A large part of the region lies within the great Tertiary basin of South America, and has a sandy or clayey soil. The climate is generally hot, except in the winter months, and the daily range of temperature is extreme. The rainfall is rather low, the heaviest precipitation occurring in summer. Except on the borders, the entire area is uncultivated and thinly populated. A few nomadic and savage Indian tribes live in the interior, and have resisted all attempts of the various governments toward their civilization. The hostility of the Indians and the dense, matted growth of vegetation along the streams have been serious obstacles to the exploration of the Gran Chaco. In the last few years Argentina and Bolivia have undertaken the exploration and development of parts of the region, and this work doubtless will be continued in the future. See Argentina; Bolivia; Paraguay.

CHACONNE, shȧ'kŭn' (Fr., from Sp. *chacona*, usually derived from Basque *chucun*, pretty). An obsolete dance. The movement is slow, and the music—a series of variations on a ground bass, mostly eight bars in length—appears in sonatas as well as in ballets.

CHACORNAC, shȧ'kôr'nȧk', Jean (1823-73). A French astronomer. He was born in Lyons, and was astronomer at the Paris Observatory from 1854 until his death. He was the discoverer of several planetoids, and published the following works: *Atlas écliptique* (1856) and *Atlas des annales de l'observatoire impérial de Paris* (1860-63).

CHAD, chăd, Saint. See Ceadda.

CHAD or **TCHAD**, Lake. A large lake in Central Africa, lying at an altitude of about 900 feet (Map: Africa, F 3). Surrounded by the French dependencies of Kanem and Bagirmi, German Kamerun, and the British possession of Bornu, the lake is within the spheres of influence of these three powers. The size of the lake varies greatly. During the dry season it is said to cover an area of about 10,000 square miles; but the area is increased to 20,000 square miles or more during the rainy season, from July to October. The water is fresh and abounds in animal life, while the surface, except during the rainy season, is thickly covered with reeds and other aquatic plants. Lake Chad receives the waters of the river Shari from the south, the Komadugu-Waube from the west, and the wet-season stream Bahr-el-Ghazal from the east, but is without any visible outlet, and the fact of the water remaining fresh gives rise to the theory that it has a subterranean outflow. The coasts are, with the exception of the northeastern portion, very low and swampy. In the eastern part of the lake there are a large number of small islands inhabited by native tribes, numbering perhaps 30,000 individuals. Islands also fringe the western shores. The lake is supposed to have been known to Ptolemy, and it was probably the Kura Lake of the Middle Ages. In modern times it was first visited by Denham and Clapperton in 1823, and later explored by Oberweg in 1851, Barth in 1852, and Nachtigal in 1871-72.

CHAD'BAND, Rev. Mr. An oily hypocrite in Dickens's *Bleak House*. He delivers impressive lectures to 'Guster' and 'Joe,' the crossing-sweeper, on the subject of 'terewth' (truth). His wife had been nurse of Esther Summerson.

CHADBOURNE, chăd'bẽrn, Paul Ansel (1823-83). An American educator. He was born in North Berwick, Maine; graduated at Williams College in 1848, and became professor of chemistry and physics there in 1853. In 1858, without giving up his duties at Williamstown, he taught the same subjects at Bowdoin College and at the Berkshire Medical College. In 1866 he became first president of the Massachusetts Agricultural College, and in 1867 was chosen president of the University of Wisconsin. He was elected to succeed Mark Hopkins as president of Williams College in 1872, but resigned in 1881, and in the following year again became president of the Massachusetts Agricultural College. During all this time he took an active part in politics, sitting twice in the Massachusetts Senate, besides carrying on manufacturing enterprises. He wrote *Natural Theology* (1867) and *Instinct in Animals and Men* (1872), and edited *Public Service of the State of New York* (1881).

CHAD'DERTON. A manufacturing town in Lancashire, England, adjacent to Oldham (q.v.). Population in 1891, 22,100; in 1901, 24,900.

CHAD'RON. A city and county-seat of Dawes County, Neb., 55 miles east by south of the northwestern corner of the State; on the Fremont, Elkhorn, and Missouri Valley Railroad (Map: Nebraska, B 1). The most important city of an extensive tract of territory, it is the centre of considerable wholesale interests, and of an export trade in live stock. There are also some industrial establishments. Population in 1890, 1867; in 1900, 1665.

CHAD'WICK, Sir Edwin (1800-90). An English social and sanitary reformer, born near Rochdale. He studied law, but early gave his attention to social and sanitary questions. An article on "Life Assurance" gained him the friendship of George Grote, and one on "Preventive Police," of Jeremy Bentham, whose private secretary he became. In 1832 he received an appointment as assistant commissioner on the first English Poor Law Commission, and to him were largely due the radical reforms made in the system of poor relief. This was followed by his appointment as secretary of the Poor Law Board, in which office and on the Board of Health for twenty years he carried out beneficent reforms. To him England owed its first Sanitary Commission, organized in 1838, and the Registrar General's office was established through his initiative. He retired on a pension in 1854. He subsequently took great interest in promoting competitive examinations for Government offices, and indeed in almost all questions of social economy. He was long an active member of the Association for the Promotion of Social Science, and of the British Association for the Advancement of Science.

CHADWICK, George Whitfield (1854—). An American composer, born in Lowell, Mass. He studied under Eugene Thayer in America, and under Jadassohn, Reinecke, and Rheinberger in Europe, where he went in 1877. Returning to America in 1880, he became organist in the South Congregational Church, Boston, and instructor in harmony and composition in the New England Conservatory of Music, of which he became director. His works include: *The Viking's Last Voyage* (1881); three overtures, *Thalia, Melpomene*, and *Rip Van Winkle;* and music for the *Columbian Ode*, sung at the opening of the World's Fair at Chicago, in 1893. His most noteworthy work is *Judith* (1901), a lyric drama, which was heralded as an example of Twentieth Century oratorio. He regularly conducts the Springfield and Worcester, Mass., festivals.

CHADWICK, James Read (1844—). An American gynecologist. He was born in Boston, and graduated at Harvard University in 1865, and at the Harvard Medical School in 1871. He founded the American Gynecological Society, was its secretary from 1876 to 1882, and became its president in 1897. He became librarian of the Boston Medical Library Association in 1875, and president of the Massachusetts Cremation Society in 1892.

CHADWICK, John White (1840-1904). An American clergyman of the Unitarian Church, born in Marblehead, Mass. For a time he was a shoemaker. He graduated in 1864 at the Harvard Divinity School, and was in the same year ordained to the Unitarian ministry and installed as pastor of the Second Unitarian Church of Brooklyn, N. Y. He is known as one of the prominent preachers of his denomination, of whose most advanced thought he was a representative. His published discourses, including *Some Aspects of Religion* (1879); *Belief and Life* (1881); *Origin and Destiny* (1883); and *A Daring Faith* (1885), have been extensively read, and have been characterized as constituting "a noble body of ethical literature." Best known, however, of his literary works, are his collections, *A Book of Poems* (1876; 7th ed., 1885); *In Nazareth Town; A Christmas Fantasy, and Other Poems* (1883); and *A Few Verses* (1900). Among his other publications may be cited a biography of Rev. N. A. Staples (1870); *The Bible of To-Day* (1875); *The Faith of Reason* (1879); *Old and New Unitarian Belief* (1894); and *Theodore Parker, Preacher, Reformer* (1900).

CHÆNOMORPHÆ, kē'nô-mōr'fê (Neo-Lat. nom. pl., from Gk. χαίνειν, *chainein*, to gape + μορφή, *morphē*, form). An order of birds, embracing the ducks, geese, swans, screamers, and flamingos and their allies. They are characterized by cranial features in common, being desmognathous, with the palatal bones united across the median line.

CHÆREA, kê-rē'ȧ, Gaius Cassius. The murderer of the Emperor Caligula (q.v.). He was tribune of the pretorian cohort. With Cornelius Sabinus and others he formed a conspiracy, and on January 24, A.D. 41, the fourth day of the Palatine Games in honor of Augustus, was the first to strike down the Emperor as the latter returned through the palace. He lent his aid to the senatorial scheme for the reëstablishment of the republic, but, when on the following day Claudius was proclaimed Emperor by the soldiers, he was executed by order of the new ruler.

CHÆREAS (kē'rē-ȧs) **AND CALLIRHOË**, kȧ-lĭr'ō-ē. A Greek romance, by an unknown writer, calling himself 'Chariton of Aphrodisias,' variously placed between the Fifth and Ninth centuries A.D. The heroine is married to Chæreas, and soon apparently dies, but comes to life in the tomb. She is carried off by robbers, and after various adventures is restored to her husband. The work was printed from the only known manuscript by James Philip d'Orville, at Amsterdam, in 1750, with a complete commentary. It has been translated into the principal modern languages.

CHÆRONEA, kĕr'ō-nē'ȧ (Lat., from Gk Χαιρώνεια, *Chairōneia*). An ancient town of Bœotia, near the Cephissus, on the borders of Phocis. Here, in B.C. 338, Philip of Macedon signally defeated the united forces of the Athenians and Bœotians, and so crushed the liberties of Greece. A mound of earth, about a mile from the modern village of Kapræna, which occupies the site of the old city, still marks the place where the Thebans who fell in the battle were buried: the grave was also marked by a magnificent colossal lion, which survived until the Greek war of liberation, when it was blown up by a Greek guerrilla, who believed it to contain treasure. At Chæronea also, B.C. 86, Sulla defeated Archelaus, the general of Mithridates. Plutarch (q.v.) was a native of this town.

CHÆTODONTIDÆ, kē'tō-dŏn'tĭ-dē (Neo-Lat. nom. pl., from Gk. χαίτη, *chaitē*, mane + ὀδούς, *odous*, tooth). A family of tropical spiny-rayed fishes. See BUTTERFLY-FISH.

CHÆTOGNATHA, kē-tŏg'nȧ-thȧ (Neo-Lat. nom. pl., from Gk. χαίτη, *chaitē*, mane + γνάθος *gnathos*, jaw). Marine annelids, cylindrical or fish-shaped, forming a group of the phylum Nemathelminthes. It includes the arrow-worms (Sagitta) and the related genus Spadella.

CHÆTOPODA, kē-tŏp'ō-dȧ (Neo-Lat. nom. pl., from Gk. χαίτη, *chaitē*, mane + πούς, *pous*, foot). Marine worms. See ANNULATA.

CHAFARINAS, chȧ-fȧ-rē'nȧs, or ZAFFARINES. A group of three small islands belonging to Spain, situated off the coast of Morocco, opposite the mouth of the Muluya River, in longitude 2° 26' W. The Chafarinas, the *Tres Insulæ* of the ancients, have long been known for the natural harbor or refuge they afford. There are fortifications on the middle island. Spain took possession of the group in 1848. Population, in 1900, 426.

CHAFER, or **COCKCHAFER** (AS. *ceafor*, Ger. *Käfer*, OHG. *kevar*, *chevaro*; probably connected with Ger. *Kiefer*, MHG. *kiver*, AS. *ceáfl*, OS. *kāfl*, jaw-bone), ETC. A beetle; properly one injurious to wood. In England all scarabs (dung-beetles) are so called, the name being found frequently as the last part of such compounds as cockchafer, leaf-chafer, rose-chafer, etc. The cockchafer, May-beetle, or dor-bug (*Melolontha vulgaris*) is substantially the same as the June-bug (q.v.) of the United States.

CHAF'FEE, ADNA ROMANZA (1842—). An American soldier. He was born at Orwell, Ohio, and in 1861 entered the Sixth United States Cavalry. He was promoted to be first lieutenant in 1865, and in the same year received the brevet of captain for gallant conduct at Dinwiddie Court House. In 1897 he was made lieutenant-colonel, and in 1898 saw service in Cuba during the Spanish-American War, distinguishing himself at El Caney, and was brevetted major-general of volunteers. In 1900 he was sent to take command of the United States forces in China, being promoted to be major-general of volunteers, and took an important part in the expedition against Peking. Subsequently he was put in command of the United States army in the Philippine Islands. In 1901 he was appointed major-general in the regular army.

CHAFFINCH (so called because the *finch* is fond of *chaff* or grain). A handsome and familiar European finch (*Fringilla cœlebs*) and one of the foremost cage-birds, especially in Germany. It is common in England and known there by many provincial names. The male, in summer, has the top of the head and nape of the neck bluish-gray; the back chestnut; the wings almost black, with two conspicuous white bars; the tail nearly black. The colors of the female (and of the male in winter) are much duller than those of the summer male. In the colder northern countries it is migratory, but spends the winter in flocks in England and all around the Mediterranean, where it is shot in great numbers for market, especially in Italy. It builds a very soft and beautiful nest, garnished with lichens and placed in a bush, and lays spotted eggs. Its food is highly varied and its habits generally are typically fringilline.

The chaffinch is one of the birds most sought by bird-catchers, as well as reared from the nest, to be a cage songster. Its naturally loud, clear, and trilling voice is susceptible of being trained almost to articulate human words; and so docile is it that the German bird-trainers teach these finches several distinct tunes and trills besides cultivating their own powers of melody and imitation. Bechstein, in *Naturgeschichte der Stubenvögel* (Gotha, 1792), gives an extended account of these vocal accomplishments, the proper acquirement of which renders chaffinches among the most valuable of cage-birds. See CAGE-BIRD, and Plate of CAGE-BIRDS.

CHAGA, chä'gȧ, or **WA CHAGA**, wä chä'gȧ. A Bantu people on the southern slopes of Mount Kilimanjaro, German East Africa. They are an interesting people, friendly, exceedingly superstitious, much harassed by the Masai, and in turn raiding the Wa Gweno and other tribes. The Chaga possess considerable skill in iron-working, their assegais being the largest and finest in Africa. Their hide shields are large, oval, decorated with totemic symbols. They employ poisoned arrows. They brew beer in large wooden vessels, and have partially domesticated the wild bee. They hunt also the abundant fauna on the slopes of Kilimanjaro, but do not ascend very high up the mountains.

CHAGOS (chä'gōs) **ISLANDS**. A small archipelago in the Indian Ocean, situated between latitudes 4° 30' and 7° 30' S. and longitudes 71° 15' and 72° 40' E. (Map: World, Eastern Hemisphere, K 28). They are mostly of coral formation. The chief island of the group, Diego Garcia, is over 12 miles long and over 6 miles wide, and has a population of 700. The chief product is cocoanut oil. The group belongs to

Great Britain, and is an administrative dependency of Mauritius.

CHAGRES, chä′grȧs. A river of Colombia, South America, flowing nearly across the Isthmus of Panama and entering the Atlantic west of Colon (Map: South America, A 2). It is over 100 miles long and it is the intention to use its abundant waters in connection with the Panama Canal (q.v.). At its mouth is situated the port of Chagres.

CHAHA, chä′hȧ, or **CHAJA**. See SCREAMER.

CHAILLÉ-LONG, shȧ′yȧ′lôɴ′, CHARLES 1840—). An American explorer. He was born in Maryland of French descent, and served in the Union Army during the Civil War. In 1869 he was appointed lieutenant-colonel in the Egyptian Army, and four years later became chief of staff to General Gordon, then engaged in suppressing the slave trade on the White Nile. Soon afterwards he was sent by the Khedive to the Court of the King of Uganda, who acknowledged himself the vassal of Egypt. He published an account of this expedition in *Central Africa: Naked Truths of Naked People* (1876). Returning to New York, he studied law at Columbia, and in 1882 went to Alexandria to practice international law. There he rendered important services during the Alexandria massacre, and the subsequent bombardment by the English squadron. In the absence of the United States consul-general and consular agents, he reëstablished the consulate and protected many Europeans and Americans. Later in the same year he practiced international law in Paris, and in 1887 was appointed United States consul-general and secretary of legation in Korea. In 1884 he published *The Three Prophets: Chinese Gordon, the Mahdi, and Arabi Pacha*.

CHAIN (OF. *chaine*, Fr. *chaîne*, Dutch *keten*, *ketting*, MLG. *kedene*, *kede*, Ger. *Kette*, OHG. *chettina*, from Lat. *catena*, chain). A series of flexibly connected links of metal or other material designed for ornament or to serve the purpose of cord, rope, or cables. Chains are evidently of very ancient origin. Nearly all old writers speak of their use, and they are repeatedly referred to in the Bible. Remnants of chains of Roman manufacture are preserved in museums and they show a variety of link formations and excellent workmanship. The uses made of chains by the ancients were few and unimportant compared with the multitude of uses to which they are applied at present. They served for ornament, as emblems of investiture and badges of office, and as fetters for captors, but cordage was employed for all other purposes to which chains are now extensively applied. Chains are now employed as ornaments and for the various purposes of a band, cord, rope, or cable in hoisting and hauling operations, in transmitting power, and in connecting, confining, and restraining objects. The modern chain of commerce, therefore, embraces chains varying in size and material, from the thread-like article of pure gold to the ship's cable of iron, each link of which weighs from 100 to 200 pounds, and will withstand a breaking strain of many tons.

Structurally, chains may be somewhat roughly divided into those whose separate links are each composed of a single piece of metal and those whose links are each made up of several separate pieces of metal. The ordinary oval link hoisting chain is an example of the first class, while the bicycle chain exemplifies quite well the second class. Chains may be also divided into hand-made and machine-made chains, but the division is not a sharp one. It is also common practice to define chains by special names based upon the form of the link, as stud chains, open-link chains, and twisted-link chains; or upon the use to which the chain is put, as crane chain, chain cable, and bicycle chains, or upon the name of the inventor or some other real or apparent peculiarity. This form of definition so far as it is practiced is neither complete nor systematic.

Chains are made in a variety of ways depending upon the material used, the size, the link formation, the purpose to which the article is to be put, etc. Chains for cranes, ship's cables, dredges, etc., are always hand-made, that is, each link is welded by hand and often is both formed and welded by hand from rolled bar iron. The various stages of operation are substantially as follows: The workman, taking a round bar or rod of iron of the proper diameter, heats it in a forge and then by means of a chisel cuts off a piece long enough to form a single link. This piece is again heated and then bent by hammer-blows around a suitably shaped nose until it has a U shape. The U-shaped piece is then hooked into the last completed link of the chain and the unconnected ends thrust again into the forge to receive a welding heat. The final process is to weld together the unconnected ends around a nose of suitable shape and to bring the link to perfect form and dimensions. In chains made as just described, the weld is usually at the end of the link. When making large ship's cables the chain-maker often uses presses for bending the bars into link form and the bending is so done as to bring the weld at the side of the link. The welding may also be done by power hammers in making very large cables.

In making stud chains or twisted-link chains the only change in the mode of procedure described above is the introduction of the necessary additional operation of inserting the brace or stud or of twisting the link, just previous to closing up the ends of the U-piece for the final welding operation. A stud chain is an open-link chain, in each link of which a transverse stud or brace is placed to prevent the sides of the links from closing up or drawing together when the chain is subjected to a heavy pull or load. Twisted links are of great advantage when a chain has to be wound on a drum, since they lie flat and smooth on the drum.

Generally speaking, all chains over one inch in size are made by hand, but the great bulk of the chains of smaller sizes are made by machinery. Machine-made iron chains are of two kinds, known as welded chains and weldless chains. In making welded chains by machine the rod of iron is first run through a machine called a winder, which winds it around a mandrel and turns it out in the form of a long spiral spring. This rod is then cut by a machine so that each twist or spiral is severed from the next and the stock is in the form of rings whose open ends only need to be welded together to form complete closed links. The welding is done by heating the ring and placing it in dies, which, under the blows of a trip-hammer operated by the workman's foot, form it into shape and weld together the open ends. The welding is done link by link as in the case of hand-made chains.

These small sizes of machine-welded chains are often made with twisted links, but are never made in the form of stud chains. Weldless machine-made chains are manufactured by automatic machinery which takes the rolled iron, cuts it into lengths, forms these lengths into links, and connects or couples the links into completed chains. In weldless chains the links are formed by twisting or locking the unconnected ends of the short lengths of rod. There are numerous forms of such connections and certain advantages are claimed for each form. Chains of this construction are made only in the small sizes which are used for horse-halters, cow-ties, dog-chains, fence-chains, sash-chains, curtain-chains, picture-chains, harness-chains, and similar purposes. For many of these purposes brass, bronze, and composition metals are used instead of iron, but the process of manufacturing the chain is otherwise unchanged. With the single exception of the stud chain, the chains so far described have each link composed of a single piece of metal bent to form and welded, twisted into a closed ring.

Chains for transmitting power are of an entirely different construction. In these each link is made of several pieces of metal connected by rivets, bolts, or stud screws, and is so formed as to engage with the teeth of a sprocket wheel. The bicycle chain is an excellent example of this variety of chains, but there are several forms in use which are even more perfect. Chains of this kind are made by assembling by hand the several parts composing each link and connecting them together; the separate parts are themselves cut, stamped, turned, threaded or otherwise formed by machinery designed especially for the purpose.

Watch-chains, neck-chains, and other chains made of precious metal for ornament form a class by themselves. Some of the larger and heavier chains of this class, which are made in the simple forms common to the chains of brass and iron which have been described, are made by methods closely corresponding to those used in making iron and brass chains. The smaller sizes of wire chains are made by machinery with twisted and locked links, others are formed by methods analogous to that adopted in producing machine-made welded chains of iron, the links being closed by brazing instead of by welding. In still other forms the links are stamped and cut from metal plate and are assembled and brazed together by hand.

The strength of chains is a very important matter in certain uses to which chains are put. For example, the safety of an anchored ship and the lives of its crew may often depend upon the strength of its chain cable. For this reason the British Admiralty and the organizations corresponding to this body which exist in other countries require all chain cable to undergo severe tests before it is used on shipboard. Similar tests are required by railways, builders of cranes and dredges, and other large users of chain. The size of chains is defined by the diameter of the bar of which the links are made; thus, a one-inch chain is one whose links are made by bars one inch in diameter. According to tests made by the United States Testing Board, "with proper material and construction the ultimate resistance of chains may be expected to vary from 155 per cent. to 170 per cent. of that of the bar used in making the links and to show an average of about 163 per cent." This conclusion refers only to hand-welded chain cable. The Pennsylvania Railroad requires its 1½-inch crane-chain to stand without giving way a pull of 70,000 pounds, and not to break under a load of 116,000 pounds. The British Admiralty requires a 2-inch stud chain cable to withstand a proof load of 72 tons before it is used. These figures are selected at random for the purpose of illustration. For a statement of the test requirements of the Pennsylvania Railroad, the British Admiralty, and the United States Testing Board, see Kent, *Mechanical Engineer's Pocket Book* (New York, 1901). Special literature on the manufacture of chains is very scarce, and such as there is will be found scattered through the engineering papers and the proceedings of the various engineering societies.

CHAIN, ANCHOR. See CABLE; ANCHOR.

CHAIN, ENGINEER'S, or SURVEYOR'S. See ENGINEERING INSTRUMENTS.

CHAIN BRIDGE. See BRIDGE.

CHAIN CABLE. See CABLES.

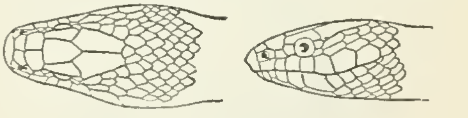
CHAIN CORAL. See HALYSITES.

CHAIN CREEPER. See BAUHINIA.

CHAIN MAIL, or **CHAIN ARMOR.** A coat of hammered iron links, interwoven into the form of a garment. It was much more flexible and convenient than either the hyrnie (q.v.) or plate armor, but was not so good a protection as the latter. It was much used from the Twelfth to the Fourteenth Century. See ARMOR.

CHAIN-SHOT. A projectile composed of two shot fastened together by a short chain, and used chiefly at sea to cut or destroy the enemy's rigging. They have long been obsolete.

CHAIN-SNAKE. A North American harmless snake (*Ophibolus getulus*), found from the Hudson River and Great Lakes to Mexico, and subject to great variation in color and markings. The typical form of the East and South is lustrous black, crossed by about thirty yellow lines which unite along the sides, forming a chain-like pattern; the belly is yellowish, blotched with black; head-plates black, with yellow spots. The lighter and larger variety west of the Mississippi is *sayi*, and that of the Pacific Coast *Boylii*. In the last the markings are ivory-white, and in the form of bands encircling the body, and broadening, but not coalescing along the sides, so that it has been described as "cream-colored, sharply marked by rings of black," instead of the reverse. Everywhere these snakes are large (4 to 5 feet), strong, active, and mainly nocturnal. They do not take to water nor climb trees, and feed mainly upon small mammals, amphibians, and reptiles, including other snakes; and they are protected by the country people of the South and West, as one of the 'king' snakes (q. v.), because they constantly destroy venomous reptiles.



CHAIN-SNAKE—TOP AND PROFILE VIEWS.

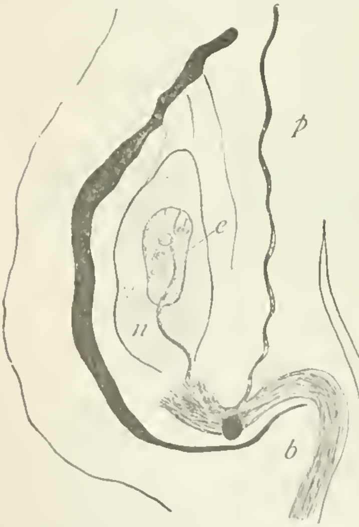
CHAISSAIGNAC, shȧ'sȧ'nyȧk', CHARLES MARIE EDOUARD (1805-79). A French physician. He was born in Nantes, and in 1835 became prosector and professor at the university and physician at the Central Bureau of the Hospitals of Paris. He is the originator of the surgical operation known as *écrasement*, by means of which tumors, piles, polypi, and other growths may be removed without the effusion of blood. The general introduction of drainage in surgery is also due to his initiative. His principal works include: *Traité de l'écrasement linéaire* (1856); *Leçons sur la trachéométrie* (1855); *Clinique chirurgicale* (1854-58); *Traité pratique de la suppuration et du drainage chirurgical* (2 vols., 1859); *Des l'empoisonnement du sang par matières organiques* (1873).

CHAIX D'EST ANGE, shā'dȧ'täNzh', GUSTAVE LOUIS ADOLPHE VICTOR CHARLES (1800-76). A French advocate and politician. In 1857 Napoleon III. appointed him *procureur général* and soon after Councilor of State. In 1862 he was made Senator. In 1863 he was vice-president of the Council of State; and in 1864 was appointed president of the Department of Public Works and Fine Arts. As an advocate, especially in criminal cases, he won great fame.

CHAJ'JUG. See HAYYUJ.

CHALAZA, kȧ-lā'zȧ (Neo-Lat., from Gk. χάλαζα, *chalaza*, hailstone, pimple). The basal region of an ovule, in which there is no differentiation of integument. See OVULE.

CHALAZOGAMY, kăl'ȧ-zŏg'ȧ-mĭ (from Gk. χάλαζα, *chalaza*, hailstone, pimple + γάμος, *gamos*, marriage, from γαμεῖν, *gamein*, to marry). The passage of the pollen-tube through the chalaza of the ovule. In seed-plants the pollen-tube ordinarily reaches the egg by passing through the micropyle, which is a small passageway left by the integument of the ovule. In certain cases, however, it has been discovered that the pollen-tube does not enter in this way, but pierces the ovule in the general region of the chalaza, which is the base of the ovule, where the integument and body of the ovule are indistinguishable. In this way the tube approaches the egg from beneath, and burrows its way through the intervening tissue. This phenomenon is known as 'chalazogamy,' as distinguished from the ordinary method, which has been called 'porogamy.' Chalazogamy has been discovered as yet only in connection with the amentaceous trees, those in which it has been recorded being birch, alder, hornbeam, walnut, hazel, casuarina, and elm. While in most of these cases the pollen-tube enters through the chalazal region, in the elm it passes into the ovule above the chalaza. However, the term chalazogamy has been extended to include all cases in which the pollen-tube does not enter by way of the micropyle.



Casuarina showing chalazogamy: *p*, pollen-tube descending to the chalazal region of the ovule and entering the bundle-region (*b*), turning upward into the nucellus (*n*), entering the embryo-sac (*e*) from below, and thus approaching the egg.

CHALCE'DON (Lat., from Καλχηδών, *Kalchēdōn*, or Χαλκηδών, *Chalkēdōn*). A city of ancient Bithynia, at the entrance of the Bosporus, opposite to Byzantium. It was founded about B.C. 677 by a colony from Megara, and soon became a place of considerable trade and importance. It contained several temples, one of which, dedicated to Apollo, had an oracle. After the liberation of the Greek cities from Persian rule, Chalcedon joined the Athenian League, but at the end of the Peloponnesian war came into possession of the Spartans. With the rest of Bithynia, it was bequeathed to the Romans by King Nicomedes. During the Mithridatic war it was the scene of a bold exploit of the Pontic sovereign. Bithynia having been invaded by Mithridates, all the wealthy Romans in the district fled for refuge to Chalcedon, whereupon he broke the chains that protected the port, burned four ships, and towed away the remaining sixty. Under the Empire Chalcedon was made a free city, and it was the scene of a general council, held A.D. 451. Chosroës II., King of Persia, captured it A.D. 616, after which it declined, until it was finally demolished by the Turks, who used its ruins to build mosques and other edifices in Constantinople. Chalcedon was the birthplace of the philosopher Xenocrates.

The Council of Chalcedon, to which allusion has been made, was the fourth general council, and was assembled by the Emperor Marcian for the purpose of drawing up a form of doctrine in regard to the nature of Christ, which should equally avoid the errors of the Nestorians (q.v.) and those of the Monophysites (q. v.). Six hundred bishops, almost all of the Eastern or Greek Church, were present. The doctrine declared to be orthodox was that in Christ there were two natures, which could not be intermixed (this clause was directed against the Monophysites), and which also were not in entire separation (this was directed against the Nestorians), but which were so conjoined that their union destroyed neither the peculiarity of each nature nor the oneness of Christ's person.

CHALCEDONY, kăl-sĕd'ō-nĭ (Lat. *chalcedonius*, a gem named after Gk. Χαλκηδών, *Chalkēdōn*, a city in Asia Minor, where it abounded, Gk. χαλκηδών, *chalkēdōn*, chalcedony). A crystalline variety of quartz of various shades of white, yellow, brown, green, and blue. It is transparent or translucent, and some of the milk-white varieties are opaque. It occurs in mammillary, botryoidal, and stalactitic shapes, and as a lining or filling of cavities in rocks. The principal varieties of chalcedony are *agate*, which is banded and striped; *carnelian*, which is clear and of various shades of red; *chrysoprase*, an apple-green variety, in which the color is due to nickel oxide; *heliotrope* or *bloodstone*, of a dark green color, with small spots of jasper; *onyx*, consisting of bands of different colors, usually black and white; *plasma*, of a deep green color; and *sardonyx*, a red banded variety of onyx, all of which are described in special articles under their names. The variety of its colors and the high luster that it takes by polishing, render chalcedony valuable for brooches, necklaces, and other ornaments, and some varieties of it are cut as seal-stones. Chalcedony is found in Great Britain, in Brazil, and in a number of localities in Colorado and California. The formation of the famous agatized wood of Chalcedony Park, Ariz., is caused by a natural replacement of the woody fibre by chalcedony from siliceous waters.

CHALCEDONYX, kăl-sĕd′ô-nĭks (from Gk. *χαλκηδών*, *chalkēdōn*, chalcedony + *ὄνυξ*, *onyx*, finger-nail, onyx. Lat. *onyx*. See CHALCEDONY). A variety of agate consisting of alternate layers of a white opaque and a grayish translucent chalcedony.

CHALCHIHUITL, chäl′chē-wē′t'l (Mexican). A green mineral referred to by Spanish writers contemporary with Cortes. It was held in high repute by the ancient Mexicans, who valued it more than gold. The Mexicans believed that the art of cutting and polishing chalchihuitl had been taught them by the god Quetzalcohuatl. The best authorities believe the mineral to have been the bluish-green variety of turquoise from Los Cerillos mines, New Mexico, although some still think it is a variety of jadeite.

CHALCIDICE, kăl-sĭd′ĭ-sē (Lat., from Gk. χαλκιδική, sc. χώρα, *chōra*, district, *Chalkidikē*, of Chalcis). The ancient name of three districts in Grecian or partly Grecian lands. (1) In Eubœa, the land belonging to the inhabitants of the town of Chalcis, on the southwestern side of the island, near the Strait of Euripus. (2) A district of Macedonia, between the Thermaic and Strymonic gulfs. The lower part of this district forms three peninsulas, called, from west to east, Pallene (or, more anciently, Phlegra), Sithonia, and Acte or Athos. This district received its name from Chalcis, in Eubœa, having been settled in the Eighth Century B.C. by colonists from that place. Among the flourishing towns of Chalcidice were Olynthus and Potidæa. (3) A district in Syria, extending eastward from the Orontes River to the desert, and called Chalcidice from the town of Chalcis, lying therein.

CHALCIS, kăl′sĭs (Lat., from Gk. *Χαλκίς*, *Chalkis*). The capital of the island and nomarchy of Eubœa, Greece, situated on the Euripus, the strait which separates the island from Bœotia (Map: Greece, E 3). The Euripus is divided into two channels, of unequal breadth and depth, by a rock, which is surmounted by a castle, partly of Venetian and partly of Turkish construction. A shallow channel, 85 feet wide, separates the rock from Bœotia, and is crossed by a stone bridge. The main channel, about 120 feet wide, through which a strong current flows, was at one time crossed by a drawbridge, which has recently been removed in connection with operations for widening and deepening the channel. The site seems to have been occupied in very early times, and during the Ninth and Eighth centuries B.C. the inhabitants were active colonizers, specially toward the north, where they gave their name to the Chalcidian peninsula on the Macedonian coast. They also appear early as allies of the Corinthians in the Greek colonization of Italy and Sicily, where they settled Cumæ and Naxos, and gave their alphabet to the Italians. After a long war with its rival, Eretria, Chalcis acquired the undisputed headship of Eubœa, and rapidly rose to wealth and importance. Its government was strongly aristocratic, but after a crushing defeat at the hands of the Athenians (B.C. 506), the nobles were driven out and a democracy established. It subsequently fell under the power of the Macedonians and Romans, and was at this time a place of great military importance, nearly nine miles in circumference, and had many fine temples, theatres, and other public buildings. Aristotle died at Chalcis. In the Middle Ages, it was prosperous under the Venetians, who held it for nearly three centuries, until its conquest by the Turks in 1470. Not many ancient remains now exist at Chalcis. The streets are narrow, but the houses, many of which owe their origin to the Venetians, are substantial and spacious. It suffered from an earthquake in 1894. Population about 9900.

CHALCIS (kăl′sĭs) **FLIES**, or **CHALCIDIDÆ**, kăl-sĭd′ĭ-dē (Neo-Lat. nom pl., from Gk. *χαλκίς*, *chalkis*, lizard, either from *Χαλκίς*, *Chalkis*, a city of Eubœa, or, more probably, like the name of the town itself, from *χαλκός*, *chalkos*, copper). A group of very small Hymenoptera, characterized by elbowed feelers. They number thousands of species, and are truly parasitic, except a few gall-making genera. One large section glues its eggs upon the backs of caterpillars of moths. These eggs hatch in about two days, when the grubs quickly bury their heads in the skin of their host and begin to feed, growing more rapidly than any other known insect-larvæ, and reaching full growth within three or four days. The first to mature then withdraws its head, preparatory to pupating—an act which at once causes the death of the exhausted caterpillar and consequently of many belated grubs. The more advanced survivors spin and attach their cocoon to the under side of the empty skin of the dead host, which thus furnishes a roof, and within about eight days complete their transformation and emerge as adult chalcids. The fact that they attack many fly-maggots, caterpillars, etc., greatly injurious to cultivated plants, and destroy them with much speed and certainty, places them among the most valuable aids mankind has in his warfare against insect pests. It is due to these insects, principally, that the cotton-worm of the South is kept down, and millions of dollars' worth of cotton saved each year. "Nowhere in Nature," remarks L. O.

CHALCIS FLY.

Howard, "is there a more marked example of the co-relation between structure and habits than occurs in this family. . . So that it is possible for an experienced person, on seeing a new species of chalcis fly, to tell precisely what kind of insect it will be found parasitic upon." See Howard, *The Insect Book* (New York, 1901); also papers, often illustrated, by L. O. Howard and Wm. H. Ashmead, in the publications of the U. S. Department of Agriculture.

CHALCOCITE. See Copper.

CHALCOGRAPHY, kăl-kŏg′rȧ-fĭ (from Gk. *χαλκός*, *chalkos*, copper + *γράφειν*, *graphein*, to write). A modern term used to signify engraving on copper.

CHALCONDYLAS, kăl-kŏn′dĭ-lȧs, Demetrius (c.1424-c.1511). A Greek scholar. He was born in Athens, and after teaching Greek in various cities of Italy, was called by Lorenzo de' Medici to the chair of Greek in Florence (1471), where Pope Leo X. was one of his pupils. After the death of the Prince (1492), he was professor of Greek in Milan, where he died. Chalcondylas wrote a Greek grammar, entitled *Erotemata* (c.1493), and superintended editions of Homer (1488), of Isocrates (1493), and of the *Lexicon* of Suidas (1499). Consult Hody, *De Græcis Illustribus*, edited by Jebb (London, 1742).

CHALCOPYRITE, kăl′kô-pī′rīt (from Gk. *χαλκός*, *chalkos*, copper + *πυρίτης*, *pyrites*, flint, from *πῦρ*, *pyr*, fire), commonly called Copper Pyrites. A copper-iron sulphide that crystallizes in the tetragonal system. It has a metallic lustre, is of a brass-yellow color, and is often tarnished or iridescent. It occurs widely disseminated in metallic veins and in the older rocks, frequently with pyrite or iron sulphide, and sometimes with nickel and cobalt sulphide. This mineral occurs in large deposits in Sweden, in the Harz Mountains, in Bohemia, Hungary, New South Wales, and in South Africa. In the United States it is found quite largely in Colorado, Montana, Arizona, Utah, and California, where it frequently carries gold and silver. It is also found in Vermont, Tennessee, and North Carolina, and is here mined as a copper ore. When tarnished it is sometimes called *peacock ore*, owing to the iridescent film of brilliant colors with which it becomes coated.

CHALDÆA, kăl-dē′ȧ. See Babylonia.

CHALDÆAN (kăl-dē′*an*) **RITE,** Christians of the, also called Syro-Chaldeans, or Syro-Orientals. A branch of the Nestorians who acknowledge the Pope of Rome. They use the Eastern rite, and are under the Patriarch of Babylon. They are supposed to number about 30,000. See Nestorians.

CHALDÆANS (from Lat. *Chaldæi*, Gk. *Χαλδαῖοι*, *Chaldaioi*, Heb. *Kasdīm*, Assyr. *Kaldi*, possibly from Assyr. *kashādu*, to conquer). Properly a designation of a Semitic people, whose original home was southeast of Babylonia, on the Persian Gulf, in the Sea Land (Mat Tamti). There was a considerable number of Kaldu States, such as Bit Ammukani, Bit Dakan, Bit Shilani, Bit Shaali, Bit Adini and Bit Yakin. Of these the most important seems to have been Bit Yakin. Hommel's theory that Ur (Mughghayar) belonged to the realm of the Kaldu as early as the Third Millennium B.C. is not convincing. It is possible that already the Pashi dynasty (B.C. 1139-1006) was Chaldæan. In the case of Mat Tamti (1006-983) and Bit Bazi (983-63), this is quite probable. Adad Nirari III., in 803, received tribute from Kaldu princes. In 723 Ukinzir, of Bit Ammukani, consequently a Chaldæan, ascended the throne of Babylon. Mardukapaliddin (Merodach Baladan), ruler of Bit Yakin, made himself King of Babylon in 721, and maintained himself with the aid of Elamites and Aramæans until 710. In 702, he returned for nine months, but was driven back to Bit Yakin by Sennacherib. In 693-89 another Chaldæan, Mushezib Marduk, occupied the throne of Babylon. But it was with Nabuapaluzur (Nabopolassar) (c.626-604) and Nabukuderuzur (Nebuchadnezzar), his son (604-561), that Chaldæan princes seated themselves upon this throne who were able to make Babylonia a world-power. Nabukuderuzur's son, Amil Marduk (Evil Merodach), who reigned 562-560, was overthrown by Nirgal Sharuzur (560-556), and the son of this usurper, Labashi Marduk (556), was the last Chaldæan king. He was supplanted by a Babylonian, Nabunaid (Nabonidos), who reigned 555-538. The period of foreign conquests and a powerful inner administration had made the terms Chaldæan and Babylonian practically synonymous with foreigners. Hebrew writers of the postexilic period speak of the Babylonians as Chaldæans (Kasdim). In the Second Century B.C. the term Chaldæan was used by the author of the Book of Daniel as a designation of a class of magicians. Concerning the Chaldæan language we have no other information than that which may be gleaned from proper names. These suggest a closer kinship to the Babylonian than to either Arabic or Aramaic. After the conquest of Babylon, the native Chaldæan dialect was no doubt crowded out by Babylonian and Aramaic. The latter was regarded by Daniel not altogether erroneously as the "language of the Chaldæans." Hence Aramaic was called 'Chaldee' by Jerome, and the confusing term has remained in use until recent times. The failure to distinguish between Babylonians and Chaldæans has added to this confusion. The Chaldi, a people related to the modern Georgians of the Caucasus, were called by the old geographers 'Pontic Chaldæans,' but they were Chaldæans in name only and non-Semitic. (See Chaldians). Consult: Delattre, "Les Chaldéens," in *Revue des questions historiques* (Paris, 1896); Winckler, *Untersuchungen zur altorientalischen Geschichte* (Leipzig, 1889); Brinton, *Protohistoric Ethnography of Western Asia* (Philadelphia, 1895).

CHALDEE (kăl′dê) **MANUSCRIPT,** The. A pungent satire, purporting to be the translation of a Chaldee manuscript newly discovered in the Great Library of Paris. It appeared, anonymously, in *Blackwood's Magazine*, October, 1817; but its conception and the first thirty-seven verses of Chapter I. are to be ascribed to James Hogg, the Ettrick Shepherd, and the rest to Professor John Wilson ('Christopher North'), and J. G. Lockhart. It ridiculed the powerful Whig party then dominant in Edinburgh, and especially the *Edinburgh Review*, which was the mouthpiece of that party. All literary Edinburgh of 1817 was brought into it, and it abounded in scathing personalities, many of which are entirely indefensible. It is divided into chapters and verses, and the diction is a parody of that of the Bible.

CHALDEE PARAPHRASE. See TARGUM.

CHALDIANS, kăl-dī'anz (Gk. *Χαλδαῖοι, Chaldaioi, Χάλδοι, Chaldoi,* Lat. *Chaldi*). A people inhabiting Armenia before the arrival of the Haik. The early Assyrian kings called this country Nairi. It was then inhabited by petty nomadic tribes of uncertain ethnic relation. About B.C. 900 the Chaldians seem to have entered the country from the northeast, and founded a powerful kingdom. The name by which they designated themselves, and the land which they conquered, was that of their chief god, Chaldis. It is impossible, as yet, to determine to what family of nations they belonged. But a connection may be suspected with such people as the Mushki, Kashki, Tabal, Kummuch, and Chatti. The Assyrians, from the time of Ashurnazirpal (885-860), called them Urartu, which may have been the name of the first tribe or district with which they became acquainted. It is possible that Arame, against whom Shalmanezer II. (859-825) fought in B.C. 857 and 845, was the first Chaldian king who succeeded in uniting under his sceptre the territory around Lake Van. In 833 Shalmanezer II. warred with a Sarduris, who is possibly to be identified with the Sarduris, son of Lutipris, of whom three inscriptions in Assyrian have been found. These agree most closely with the Assyrian inscriptions of the time in form and character. Ispuinis, who is called Ushpina by Shamshi Adad IV. (825-812), associated with himself his son, Mennas. It is possible that Ispuinis was the conqueror and organizer of the territory of Biaina, and that he made Tuspas the capital. Mennas is known to us chiefly through his building enterprises. The canals he constructed reveal the great architectural skill of the builders and their remarkable knowledge of hydraulics. They also show the great extent of territory and large resources of the King. In 802, 792, and 785 Adad Nirani III. (812-783) made campaigns against Mennas. About eighty inscriptions in the Chaldian language of this King have been found. Argistis (785-760), a great conqueror, further extended the boundaries of Chaldia. He left a long inscription on the rock of Van, and many others. In vain Shalmanezer III. (783-773) repeatedly invaded his territory. He was defeated, and the power of the Chaldian king grew apace. Sarduris II. (760-730) appears to have a right to call himself 'king of kings,' as he was the actual liege lord over the whole territory known as Suri (hence Syria), extending over Melitene, Commagene, Arpad, Cilicia, and some adjoining districts. Owing to the weakness of Assyria during the generation from Shalmanezer III. to Tiglathpileser III., Chaldia became quite the most important power in Western Asia. In the struggle for empire between Chaldia and Assyria, Tiglathpileser III. (745-728) was able in 735, by an expedition into the very heart of Chaldia, to establish the Assyrian power in Asia by greatly weakening the rival State, yet was obliged to retire without being able to capture the impregnable capital. The final struggle between Rusas I. (730-712) and Sargon (722-705) ended in the loss of Chaldian supremacy. The Assyrian reports are indeed wrong in stating that Rusas committed suicide. He was even able to extend his power somewhat after the alleged defeat, north and east. But in the west and the south Assyria had effectually checked the growth of Chaldia. And toward the end of Sargon's reign the Kimmerians fell upon Chaldia from the north. This invasion Argistis III., mentioned by Sargon in 709, or his successor, Rusas II., seems to have still been in a position to repulse. But their territory unquestionably suffered much. Internally these reigns are marked by great advance in architecture, sculpture, and other arts. Rusas II. built an important residence city at Toprakkaleh, near Van, called Rusachina, the ruins of which have been excavated. Erimenas is known only as the father of Rusas III., who appears to have been the father of Sarduris III., mentioned in an inscription of Assurbanipal (668-626) as having finally submitted to Assyrian suzerainty. If this is more than a vain boast, it may mean that the Scythians (Ashkuza), having established themselves in the territory of the Manuai, and become allies of the Assyrians about 630, forced their western neighbors to seek safety from repeated raids in acknowledging Assyrian authority. It is possible that with the fall of the Scythian power through the Medes, the Chaldians also were incorporated in the Median Empire immediately before or soon after the destruction of Nineveh, in 607. The invasion of the Haik, the modern Armenians, in the Sixth Century B.C. drove the Chaldians into exile. While the Assyrian form of the name survived in the biblical Ararat (Gen. viii. 4; Jeremiah li. 27; II. Kings xix. 37; Isaiah xxxvii. 38) and in the Alarodioi, who, according to Herodotus, served in the army of Xerxes, the name of Chaldian has been preserved in the Chaldaioi of Sophocles, Xenophon, Strabo, and Plutarch, in the Chaldoi and the theme Chaldia of Byzantine times, and in numerous place-names. Possibly there is even a remnant of the old Chaldians in Chalt, near Baiburt.

The Chaldians worshiped as their highest god Chaldis, by the side of him Ardinis, a sun-god, and Teisbas, a storm-god, as well as a host of minor deities conceived as the sons of Chaldis. Their civilization was no doubt borrowed from Assyria, but in some respects advanced beyond the point reached by the Assyrians themselves. They were probably the discoverers of the methods of iron-working, for which the region became famous among the Greeks. Unlike the Assyrians, they erected their buildings of massive walls of stone. The country was intersected with fine roads and canals, showing great technical knowledge. Their sculptures are more lifelike than the Assyrian. They excelled in mosaics, filigree-work, and ceramics.

The Chaldian language was written in cuneiform characters, borrowed from the Assyrian, but simplified by giving only one value to each sign, avoiding signs representing closed syllables, and using as a rule separate signs for the vowels, thus made to approach to a purely alphabetical system. The family to which it belongs has not been determined. It has some affinity with the Georgian, and may belong to the same group as Mitanian, Hittite, and some early Asian languages. Nearly two hundred native inscriptions have been discovered in all parts of modern Armenia, presenting some dialectical differences. They were first studied by Schultz and Hincks, who worked out the general idea with the aid of Assyrian ideographs. Guyard first noticed the identity of the imprecations at the end of the inscription with those found on Assyrian documents. Sayce established the main outlines of the grammar. D. H. Müller cleared up many difficulties. Belck and Lehmann discovered most of the inscriptions, and Sandolgian has brought them together in a corpus.

BIBLIOGRAPHY. A good account of the Chaldians is found in Maspéro. *The Passing of the Empires* (London, 1899). Consult: Sayce, in *Journal of the Royal Asiatic Society*, XIV.-XX. (London, 1882-94); Belck and Lehmann, *Zeitschrift für Ethnologie* (Berlin, 1892, et seq.): id., in *Zeitschrift für Assyriologie* (Leipzig, 1892, et seq.) and in *Verhandlungen der Berliner anthropologischen Gesellschaft* (Berlin, 1892, et seq.); Müller, *Die Keilinschrift von Aschrut Daga* (Vienna, 1890); Nikolsky, *Les inscriptions cunéiformes de Koelani Girlan* (1893); Olmstead, in *American Journal of Semitic Languages* (Chicago, 1901).

CHÂLET, shȧ'lā' (from Med. Lat. *castelletum*, dim. of *castellum*, fort, castle, from *castrum*, fort). The French-Swiss name for the wooden summer hut of the Swiss herdsmen on the mountains: but the term is also extended to include Swiss houses generally, and picturesque and ornate villas built in imitation of them.

CHALEURS BAY, or **BAIE DES CHALEURS**, bâ dȧ shȧ'lẽr' (Fr., bay of heat). An inlet on the west side of the Gulf of Saint Lawrence, which partly separates New Brunswick from Quebec (Map: Newfoundland, D 5). It is about eighty-five miles in length from east to west, and has a maximum width of over 20 miles. While its depth is only about 250 feet in the channel, yet a depth of 100 feet is found quite near the shore, thus affording commodious anchorage and easy access to the land. Chaleurs Bay receives numerous small streams, chief of which are the Nepisiguit River from the south, and the the Patapedia River from the west. Fishing is the chief industry. A number of towns skirt the shore. Chaleurs Bay receives its name from Jacques Cartier, who entered it in the hottest month of 1535.

CHALICE, chăl'ĭs (Fr. *calice*, It. *calice*, AS. *calic*, Ger. *Kelch*, OHG. *chelih*, from Lat. *calix*, Skt. *kalaśa*, cup). This ancient name for a drinking-cup has been retained for the vessels used for the wine in the holy sacrament. Some of the earliest were made of wood or horn: others, of which there are some superb Byzantine examples, of glass, crystal, or agate. But on account of their fragility, these materials fell into general disuse in favor of precious metals; and most mediæval, Renaissance, and modern chalices are of gold, silver-gilt, or silver, often decorated with enamels and set with precious stones. They were among the objects on which the goldsmith lavished the greatest care. Many examples remain in industrial and other museums, and in church treasuries throughout Europe: in some cases, small parish or cathedral churches have preserved their old pieces more carefully than the larger institutions.

There were two classes of chalices: the ordinary chalice, used by the priest at the altar, and the ministering chalice, for the communion of the congregation. The latter was larger and frequently had two handles. The chalice always consisted of three parts—a bowl, a long neck, and a foot. It varied very much in shape. The earliest (Fourth to Eight Century) had a deep, slender bowl, which became broader and more semicircular in the Romanesque age, and then changed radically during the Gothic period, passing first to a broader flat bowl, with enlarged foot, and then to a conical, funnel-shaped bowl with longer neck, often broken with bulbs. The bowl itself, which was originally the most decorative part, tended to become the simplest with smooth surface. The chalice is the symbol of Saint John the Evangelist. Consult: Giefers, *Ueber den Altarkelch* (Paderborn, 1856); Corblet, *Histoire du sacrement de l'Eucharistie* (Paris, 1885).

CHALK (AS. *cealc*, Ger. *Kalk*, Fr. *chaux*, Ir. *caile*, from Lat. *calx*, lime). A soft earthy variety of limestone or carbonate of lime, which often forms beds of great thickness and extent. It is usually yellowish or white in color, has an earthy texture, is rough to the touch, and adheres slightly to the tongue. The average chemical composition is as follows: (1) English chalk—calcium carbonate, 97.90 per cent.; silica, .66 per cent.; magnesium carbonate, 0.10 per cent.; ferric oxide, 0.35 per cent.; (2) Arkansas chalk—calcium carbonate, 95.29 per cent.; silica, 4.42 per cent.; alumina, 2.21 per cent.; ferric oxide, 2.21 per cent.

Chalk is formed by the accumulation on the ocean bottom of the tiny shells of Foraminifera, fragments of molluscan shells, sea-urchins' spines, and sponge-spicules, and when a thin sample of it is examined under the microscope it is an object of great beauty. It is very abundant in certain areas and also in certain geological formations, the Cretaceous system being so named on account of the thick and extensive deposits of chalk which it contains. These deposits are especially abundant in England and France, where the great white cliffs of chalk on both sides of the English Channel, notably in the vicinity of Dover, England, and Dieppe, France, are conspicuous objects. Under London the chalk formation has a thickness of from 600 to 800 feet. In the United States chalk is known to occur in Iowa, Texas, and Arkansas, and other States.

Chalk is sometimes used as a building-stone, for, while it is sufficiently soft when fresh to be sawn, it often shows a tendency to harden on exposure to the air. It is burned to lime and the mortar is used generally in the construction of buildings in London. In England chalk has been used for many years as an ingredient of Portland cement, and more recently the Arkansas chalk has been employed for the same purpose. When ground and mixed with water it forms 'whitewash.' If the ground material is freed from grit by washing, it is known as 'whiting,' which is used for cleaning silver and making putty. 'Gilder's white' and 'Paris white' are forms of the same material which have been more carefully washed. On account of its color and softness, it finds general application as a marking material, but when so used has to be mixed with some bonding substance. (See CRAYON.) Like lime and gypsum, chalk is used in farming to ameliorate the texture of the soil. In a purified condition it is administered as medicine to correct acidity of the stomach. See CRETACEOUS SYSTEM; SOIL; PORTLAND CEMENT; LIME.

CHALK, BLACK. See CRAYON.

CHALK FORMATION. See CRETACEOUS SYSTEM.

CHALKSTONE, LORD. A character which Garrick himself impersonated most successfully in his play *Lethe*.

CHALLEMEL-LACOUR, shál'mĕl' lá'ko͞or', PAUL AMAND (1827-96). A French publicist and politician. He became professor of philosophy at the Lyceum of Pau in 1849, and at the time of the coup d'état, while holding a similar position at the Lyceum of Limoges, was arrested because of his pronounced Republican opinions. After a few months of imprisonment, he was expelled from France. He went to Belgium, where he lectured on literature, and thence to Germany and Italy. In 1856 he became professor of French literature at the Polytechnic Institute of Zurich, and in 1859, being amnestied, returned to France. He soon became known as one of the ablest contributors to the *Temps*, the *Revue Moderne*, and other influential journals. For a short time he was editor of the *Revue des Deux Mondes*. After the fall of the Empire he became prefect of the Department of the Rhône. He was elected deputy (1872), Senator (1876), president of the Senate (1893). He was, from 1880 to 1882, Ambassador to England, and became Minister of Foreign Affairs in 1883. He translated Ritter's *Geschichte der Philosophie*, and edited the *Works* of Madame d'Epinay, the friend of Rousseau. His essays were collected as *Etudes et réflections d'un pessimiste* (1901).

CHALLENGE (OF. *chalenge*, *chalonge*, It. *calogna*, accusation, from Lat. *calumnia*, false accusation, from *calvi*, to deceive). In criminal law, a request or demand to fight with deadly weapons. No set phrase or form of words is necessary to constitute a challenge. Any language which, when connected with the circumstances of a quarrel and the conduct of the parties, shows an intention to invite or solicit a meeting in order to fight with deadly weapons, amounts to a challenge. Giving a challenge, or knowingly bearing one, or even inciting to a challenge, is a criminal offense at common law. The tendency of modern statutes is to subject all persons connected with a challenge to severe criminal punishment, and to disqualify them from holding public office thereafter. See DUELING.

In civil procedure, a challenge is a formal exception taken to one or more jurors. When exception is taken to the entire panel, it is called a challenge *to the array*, or *to the panel*, or a motion to set aside the panel, or to quash the array. A challenge is said to be *for cause*, when it is based upon a state of facts which, if established, renders the juror incompetent, as that he is pecuniarily interested in the case, or disqualified by reason of age, sex, or mental condition. A challenge is said to be *to the favor*, when founded on a charge that the juror is biased or subject to some improper influence. A *peremptory* challenge is one for which no reason need be assigned. The number of peremptory challenges, and the criminal cases in which they are allowed, are regulated by statute. Challenges are to be made after the appearance of the jurors and before they are sworn. See JURY.

CHALLENGER EXPEDITION. A scientific exploration of the open sea sent out by the British Government in 1872-76. In 1872 the *Challenger*, a corvette of 2306 tons, was completely fitted out and furnished with every scientific appliance for examining the sea from surface to bottom, e.g. with natural-history workroom, chemical laboratory, and aquarium. The ship was placed in charge of a naval surveying staff under Captain Nares and of a scientific staff, with Prof. Wyville Thomson (q.v.) at their head, for the purpose of sounding the depths, mapping the basins, and determining the physical and biological conditions of the Atlantic, the Southern, and the Pacific Oceans. During three and a half years the *Challenger* cruised over 68,900 nautical miles. Investigations were made at 362 stations, at each of which were determined the depth of channel, the bottom, surface, and intermediate temperatures, currents, and fauna, and the atmospheric and meteorological conditions. The route was by Madeira, the Canaries, the West Indies, Nova Scotia, Bermudas, Azores, Cape Verde, Fernando Noronha, Bahia, Tristan d'Acunha, Cape of Good Hope, Kerguelen, Melbourne, the Chinese Sea, Hong Kong, Japan, Valparaiso, Straits of Magellan, Montevideo, Vigo, and Portsmouth. Between the Admiralty Islands and Japan the *Challenger* made her deepest sounding, 4575 fathoms. Consult Wyville Thomson and Dr. John Murray, editors of the copious *Reports on the Scientific Results of the Voyage of H. M. S. Challenger* (50 vols., London, 1880-95). They fall into a *Narrative* (2 vols., 1882-85); *Zoölogy* (30 vols., 1880-89); *Physics and Chemistry* (3 vols., 1884-89); *Botany* (1885-86). A popular narrative of the cruise is Moseley's *A Naturalist on the Challenger* (London, 1879).

CHAL'LIS, JAMES (1803-82). An English astronomer. He was born at Braintree, Essex, and was educated at Trinity College, Cambridge. He became Plumian professor of astronomy and experimental philosophy at Cambridge in 1836, and from then until 1861 was also director of the Cambridge observatory. His labors were directed principally to the determination of the positions of sun, moon, and planets, with the object of increasing tabular accuracy. Among the valuable improvements devised by him were the collimating eye-piece (1850), the transit-reducer, and the meteoroscope. In addition to 225 contributions to scientific publications, he published several independent works on astronomy, mathematics, and physics.

CHAL'LONER, RICHARD (1691-1781). An English Catholic prelate. He was the son of a dissenter, but was brought up among Roman Catholics and sent to an English college at Douai, where he finally became professor of divinity and vice-rector. In 1730 he joined the English mission in London, and on the death of Dr. Benjamin Petre, in 1758, he became vicar apostolic of the London district. During much of his residence he was subjected to persecutions. He was the author of numerous controversial and devotional works, the most popular one being *The Garden of the Soul* (1740), which has been translated into various languages and continues to be the most popular prayer-book among English Catholics. As an antidote to Fox's well-known *Martyrology*, he wrote *Memoirs of Missionary Priests and Other Catholics of Both Sexes that Have Suffered Death in England on Religious Accounts* (1741-42). He published a version of the Douai Bible, which is substantially that used by English-speaking Catholics. For his *Life*, consult Barnard (1784).

CHAL'MERS, Alexander (1759-1834). A Scottish biographer and editor. He was educated in Aberdeen, and early in life edited several newspapers in London, besides contributing to periodicals, but he devoted himself chiefly to writing prefaces for new editions of English classics. Of the many works edited by him, *The British Essayists*, in forty-five volumes, is still regarded as useful. His fame rests more particularly on his *General Biographical Dictionary* (32 vols., 1812-14), in which, however, the various articles are, for the most part, long and tedious and lacking in research and accuracy.

CHALMERS, George (1742-1825). A Scottish antiquarian and historian. He was educated in Aberdeen, studied law in Edinburgh, emigrated to America in 1763, and practiced law in Baltimore until the Revolution. Being a loyalist, he then returned to Great Britain, and from 1786 until his death was chief clerk of the Board of Trade. He wrote a number of works on the Colonies, and biographies of De Foe, Thomas Paine, and Mary, Queen of Scots; but his most important work is *Caledonia: An Account, Historical and Topographical, of North Britain* (1807-24), which displays profound research into the history of Scotland, and is not yet entirely superseded.

CHALMERS, George Paul (1836-78). A Scottish painter, born in Montrose. He studied at the Trustees School in Edinburgh under Scott Lauder, and began by painting portraits. Afterwards his work included subject-pictures and landscapes. Among these are "The Favorite Air" (1854); "The End of the Harvest" (1873); and "Running Water" (1875).

CHALMERS, Thomas (1780-1847). A Scottish theologian. He was born in Anstruther, Fifeshire, Easter day, March 17, 1780, educated at the University of Saint Andrews, and in his nineteenth year licensed to preach the gospel. In 1803 he was ordained minister of the parish of Kilmany, in Fifeshire, near Saint Andrews. At this period his attention was entirely absorbed by mathematics, political economy, and natural philosophy, to the neglect of the studies appertaining to his profession. But personal illness, new anxieties, the reading of Wilberforce's *View of Practical Religion*, and thought required for his article on Christianity for Brewster's *Edinburgh Encyclopædia* (1810) awakened his dormant spiritual nature, and he grew earnest, eloquent, devout, and faithful to his pastoral duties. In July, 1815, he was translated to the Tron Church and Parish, Glasgow, where his magnificent oratory took the city by storm. His *Astronomical Discourses* (1817) had a prodigious popularity. During the same year he visited London, where his preaching excited as great sensation as at home. But Chalmers's energies could not be exhausted by mere oratory. Discovering that his parish was in a state of great ignorance and immorality, he began to devise a scheme for overtaking and checking the alarming evil. It seemed to him that the only means by which this could be accomplished was by "revivifying, remodeling, and extending the old parochial economy of Scotland," which had proved so fruitful of good in the rural parishes. In order to wrestle more closely with the ignorance and vice of Glasgow, Chalmers, in 1819, became minister of Saint John's parish, "the population of which was made up principally of weavers, laborers, factory-workers, and other operatives." Of its 2000 families, more than 800 had no connection with any Christian Church and the children were growing up in ignorance. He broke up his parish into twenty-five districts, each of which he placed under separate management, and established two week-day schools, and between 40 and 50 local Sabbath-schools, for the instruction of the "poorer and neglected classes," more than 1000 of whom attended. In a multitude of other ways he sought to elevate and purify the lives of his parishioners. See Chalmers's *Christian and Civic Economy of Large Towns* (3 vols., 1821-26). His plan of parochial work carried out in Glasgow, although abandoned soon after its inception and not elsewhere imitated, may be called the suggestion of the modern method of dealing with the dependent classes as seen in the charity organization societies and in settlement work. His parental relation to these phenomena has found deserved recognition in the condensed edition of his *Christian and Civic Economy*, by Prof. C. R. Henderson (New York, 1900), and in a similar work published in London in the same year, *Chalmers on Charity, a Selection of Passages and Scenes to Illustrate the Social Teaching and Practical Work of Thomas Chalmers*, edited by N. Masterman.

But such herculean toils began to undermine his constitution, and in 1823 he accepted the offer of the moral philosophy chair in Saint Andrews, where he wrote his treatise on the *Use and Abuse of Literary and Ecclesiastical Endowments* (1827). In 1828 he was transferred to the chair of theology in Edinburgh, and in 1832 published a work on political economy in connection with the moral state and moral prospects of society. In 1833 appeared his Bridgewater treatise, *On the Adaptation of External Nature to the Moral and Intellectual Constitution of Man*. It was received with great favor, and obtained for the author many literary honors, the Royal Society of Edinburgh electing him a fellow, and the French Institute a corresponding member, while the University of Oxford conferred upon him the degree of D.C.L. In 1834 he was appointed convener of the church-extension committee; and after seven years of enthusiastic labor, announced that upward of £300,000 had been collected from the nation, and 220 new churches built. Meanwhile, however, troubles were springing up in the bosom of the Church itself. The evangelical party had become predominant in the General Assembly, and came forward as the vindicators of popular rights; the struggles in regard to patronage between them and the 'moderate' or 'Erastian' party became keener and more frequent, until the decision of the civil courts in the famous 'Auchterarder' and 'Strathbogie' cases brought matters to a crisis; and on May 18, 1843, Chalmers, followed by 470 clergymen, left the Church of his fathers, rather than sacrifice those principles which he believed essential to the purity, honor, and independence of the Church. (See Presbyterian Churches.) The rapid formation and organization of the Free Church were greatly owing to his indefatigable exertions, in consequence of which he was elected principal of the Free Church College, and spent the close of his life in the zealous performance of his learned duties, and in perfecting his *Institutes of Theology.* He died suddenly at Morningside, Edinburgh, May 30, 1847.

The works of Chalmers contain valuable, and in some cases original, contributions to the sciences of natural theology, Christian apologetics, and political economy; while on minor topics, such as the Church-establishment question, they exhibit both novelty and ingenuity of argument. As an orator, Chalmers was unique and unrivaled. His works were collected (23 vols., 1836-42); posthumous works (9 vols., 1847-49); select works (12 vols., 1854-79). For his life, consult: W. Hanna (4 vols., Edinburgh, 1849-52); D. Fraser (New York, 1881); Mrs. Oliphant (London, 1893, 2d ed., 1896); W. G. Blaikee (New York, 1897).

CHAL′ON, JOHN JAMES (1778-1854). An English artist, born in Geneva, Switzerland. He was a pupil of the Royal Academy and became a member in 1841. His picture "Napoleon on Board the *Bellerophon*" is in Greenwich Hospital, and "A View of Hastings" in South Kensington. His brother, ALFRED EDWARD (1781-1860), born in the same place, became a painter in water-color to Queen Victoria. He painted portraits of many of the aristocratic ladies of the day. Like his brother, he painted in oil also, and some of his subject pictures have been taken for originals of Watteau.

CHÂLONS-SUR-MARNE, shȧ′lôɴ′ sụr märn′. A garrison town of France, capital of the Department of Marne, 107 miles east of Paris by rail, on the right bank of the River Marne, which is here crossed by a handsome stone bridge (Map: France, L 3). Châlons-sur-Marne is an old walled town and the seat of a bishopric. The houses are chiefly of timber, lath, and plaster. The situation, however, is agreeable, and the town contains some fine public buildings, the principal of which is the cathedral of Saint Etienne, which contains one of the finest grand altars in France. On the east side of the town there is the splendid *Promenade du Jard*, or park, which covers nineteen acres. Châlons has a school of industry, a communal college, a seminary, a museum, and a library. It manufactures woolens, cotton, leather, etc., and has a considerable trade in grain, hemp, rape-seed oil, and champagne. Population in 1901, of town, 21,290; of commune, 26,737. Châlons is of great historical importance. It was known as the Roman Catalaunum in the Third Century; witnessed the defeat of Tetricus by Aurelian in A.D. 274; of the Alemanni by Jovinus in 266; and here or in the district (Catalaunian Fields), in 451, was fought one of the fifteen decisive battles of the world (according to Sir Edward Creasy), when the Romans and their allies, the Visigoths, defeated Attila and his Huns. The town successfully resisted the English attacks in 1430-34; it was taken by the Prussians in 1814, and by the Russians in the following year. In 1870 it was occupied by the Germans after the evacuation by MacMahon of the celebrated camp established here in 1856 by Napoleon III.

CHALON-SUR-SAÔNE, sụr sôn. The capital of an arrondissement of the Department Saône-et-Loire, France, about 33 miles north of Mâcon (Map: France, L 5). It is situated on the right bank of the Saône, at the point where that river is joined by the Canal du Centre, which unites the Saône with the Loire. Vineyards, woods, meadows, and cultivated fields surround it and add variety and beauty to the situation. It is an irregularly built town with walls and towers, although along the river the houses are modern and in some cases luxurious, and the quays are excellent. It has two fine churches, a communal college, and a library of 22,000 volumes. Its manufactures include hats, hosiery, vinegar, oil, pottery, jewelry, and imitation pearls; and it has a large trade in the agricultural and other produce of the district. Steamboats navigate the Saône from Chalon-sur-Saône downward. Population, in 1901, of town, 25,565; of commune, 29,058. Chalon-sur-Saône occupies the site of the ancient Cabillonum or Caballinum.

CHALOTAIS, shȧ′lô′tȧ′, LOUIS RENÉ DE CARADERIC, LA. See LA CHALOTAIS, LOUIS RENÉ DE CARADERIC.

CHALUKYAS, chȧ-lōō′kyȧs. The names of several dynasties of Hindu kings. The early and western Chalukyas of Bādāmi and Kalyāna ruled during the Sixth and Seventh centuries A.D., and another line of the same dynasty reigned over Kalyāna from A.D. 973 to 1183. The other important lines of the Chalukyas were the eastern (A.D. 615-1127), and the Chalukyas of Anhilvād (A.D. 941-1296).

CHALYBEATE (kȧ-lĭb′ê-ȧt) **WAT′ERS** (from Lat. *chalybs*, Gk. *χάλυψ*, *chalyps*, from *Χάλυβες*, *Chalybes*, iron-workers in Asia Minor). Natural mineral waters that contain considerable amounts of iron in solution. The carbonate is generally held in solution by an excess of carbonic acid, and is precipitated as soon as the latter has escaped into the air. This accounts for the characteristic deposits of ochre or ferric oxide on the surface of stones near the mouth of chalybeate-water springs. Chalybeate springs may be subdivided into *carbonated chalybeate* (or *carbonated ferruginous*) and *sulphated chalybeate.* Examples of the former are Islington Spa, Oddy's Saline Water, and Tunbridge Wells, England; and Bailey Springs, Alabama, and Rawley Springs, Virginia, in the United States. An excess of carbonic acid communicates to the water a sparkling aspect and a pleasant acidulous taste. Of such a character are the mineral springs at Pyrmont in Germany, and they are called *carbonated chalybeate* or *carbonated ferruginous.* The sulphated chalybeate waters contain ferrous sulphate dissolved in them, and of this character are the Sand Rock Spring on the Isle of Wight, and the Springs at Moffat and Vicarsbridge in England, and the Rockbridge Alum Springs, Virginia, and the Texas Sour Springs, in the United States. Chalybeate waters have a more or less astringent or styptic taste, and show a purplish black tint when mixed with some varieties of wine, owing to the tannin present. A pale blue color is produced when a few drops of potassium ferrocyanide are added. Chalybeate waters are frequently prescribed in cases of debility, and as the carbonated varieties are lighter on the stomach, they are generally preferred. The chalybeate waters should be avoided in plethoric, febrile, and inflammatory conditions of the system. See CARBONATED OR ACIDULOUS WATERS; and MINERAL WATERS.

CHAM, shäɴ (1819-79). The pseudonym of Count Amédée de Noé, a French caricaturist. He was born in Paris, the son of a peer of France. He was intended for science, but preferring painting, he studied with Paul Delaroche and afterwards with Charlet, and developed a talent for the grotesque. Beginning in 1842, he contributed, chiefly to *Charivari* (the *Punch* of Paris), an immense number of caricatures, and some sketches, under the signature of 'Cham.' His political cartoons were singularly sharp and effective. He also produced several vaudevilles.

CHAMÆROPS, kăm′ê-rŏps (Lat., from Gk. χαμαίρωψ, *chamairops*, from χαμαί, *chamai*, on the ground + ῥώψ, *rhops*, bush). A genus of palms with fan-shaped leaves. It is less exclusively tropical than palms are in general, and one species, *Chamærops humilis*, is the only palm truly indigenous to Europe. It extends as far northward as the neighborhood of Nice. It is sometimes called the palmetto. The flowers are in spathes about 6 to 8 inches long; the fruit is a three-sided, blackish, spongy drupe, which is eaten, as are also the young shoots. This palm is one of the most tolerant of all palms to cold, and, on that account, is commonly grown. In its native regions the leaves are much used for thatching, and for making brooms, hats, chair-bottoms, etc. They abound in an excellent fibre, which the Arabs mix with camel's hair, and make into tent-covers; cordage and sometimes sail-cloth are made of it in Spain; it is imported into France, and used for making carpets, under the name of African hair. The French in Algeria make paper and pasteboard of it; and it is a valuable commercial commodity, as a material for paper-making, cordage, upholstery, etc. Other species, sometimes referred to this genus, abundant in India, China, etc., serve similar purposes, and deserve attention in connection with paper. To this genus is referred also the West Indian palm, which yields the material for chip hats. See Brazilian Grass.

Fossil Forms. Several species of the genus Chamærops, recognized by their leaves alone, have been found in the Tertiary deposits of Europe and North America. In former times the genus grew over an area that extended much farther northward than its present area of distribution does now—namely, as far as the latitude of England and Germany—and the species found show little variation from those living at the present day. See Palm; Fossil.

CHAMALHARI, chá-mäl′há-rê. A peak of the Himalayas (q.v.), in northwestern Bhutan (Map: India, E 3). It has an altitude of about 24,000 feet.

CHAM′BA. One of the feudatory Punjab States of northern India, between latitudes 32° and 33° 9′ N., and longitudes 75° 54′ and 76° 30′ E. (Map: India, C 2). Area, 3126 square miles. Population, in 1891, 124,032; in 1901, 128,000.

CHAMBERED NAUTILUS, The. A noted poem by Oliver Wendell Holmes, published in 1857, in his *Autocrat of the Breakfast-Table.*

CHAMBERLAIN, chām′bẽr-lĭn. A city and county-seat of Brule County, S. D., 65 miles southeast of Pierre, on the Missouri River and on the Chicago, Milwaukee and Saint Paul Railroad. It is in the centre of a fine stock-raising region, and carries on a considerable trade by river. The city is the seat of a Government Indian school. Population, in 1890, 939; in 1900, 874.

CHAMBERLAIN (OF. *chambrelein, chamberlain*, Fr. *chambellan*, Sp. *camarlengo*, It. *camarlingo*, from Med. Lat. *camarlingus*, from OHG. *chamarlino, chamarling*, chamberlain, from *chamara*, Ger. *Kammer*, room, from Lat. *camera*, room, Gk. καμάρα, *kamara*, room with vaulted ceiling; connected with Lat. *camur*, crooked, Gk. κάμπτειν, *kamptein*, to bend, Ir. *cam*, crooked), Lord. In Great Britain an officer of state dating from very early times, formerly an influential member of the Government and still of high standing in the royal household. He indorses the King's answer on petitions and often communicates his Majesty's pleasure to Parliament and to the council. He has control over all the officers and servants of the royal chambers, except those of the bedchamber, as well as of all tradesmen connected with the royal household. Cards of admission to the King's drawing-room and other royal functions must be obtained from him. All theatres in towns in which a royal palace is situated require to be licensed by the Lord Chamberlain, and no new play can be performed anywhere without his license. One of the leading members of his staff is the Examiner of Plays, whose duties are to attend to these matters. In accordance with ancient custom, the Lord Chamberlain is still a member of the privy council, but his tenure of office depends on that of the political party to which he belongs.

CHAMBERLAIN, The Lord Great. In Great Britain an hereditary officer of great antiquity, and formerly of great importance. He has the government of the palace at Westminster, and, during the sitting of Parliament, has charge of the House of Lords, and issues tickets of admission on the opening or prorogation of Parliament.

CHAMBERLAIN, Austen (1863—). An English politician, eldest son of Joseph Chamberlain. He was educated at Rugby and at Trinity College, Cambridge, and was elected to Parliament from East Worcestershire. In 1900 he became Financial Secretary to the Treasury; and in 1902, upon the formation of the Balfour Cabinet, Postmaster-General of the British Post-Office.

CHAMBERLAIN, Alexander Francis (1865—). A Canadian ethnologist and educator, born at Kenninghall, England. He graduated in 1886 at Toronto University, and from 1886 to 1891 was examiner in modern languages successively at Toronto University, Trinity University, and in the educational department of Ontario Province. He was appointed lecturer on anthropology at Clark University in 1892. He is a fellow of the American Association for the Advancement of Science, a member and officer of many learned societies, and in addition to contributions to *The Journal of American Folk-Lore, Modern Language Notes,* and other periodicals, has published *Report on the Kootenay Indians* (1892); *Language of the Mississaga Indians* (1892); *The Mythology of the Columbian Discovery* (1893); and *The Child and Childhood in Folk-Thought* (1896).

CHAMBERLAIN, Daniel Henry (1835—). An American politician. He was born at West Brookfield, Mass., and was educated at Yale and at the Harvard Law School. In 1864 he entered the Union Army and served until the close of the Civil War, chiefly as a staff officer. At the close of the war he settled in South Carolina, where he became a cotton-planter, and was a member of the State Constitutional Convention (1867-68), Attorney-General (1868-72), and Governor (1874-76). He was inaugurated a second time, but his election was contested by Wade Hampton, and he relinquished his office (1877) and removed to New York to practice his profession.

CHAMBERLAIN, Jacob (1835—). An American missionary of the Reformed Dutch Church, born at Sharon, Conn. He graduated at the Western Reserve College, 1856, and New Brunswick Theological Seminary, 1859, and received the degree of M.D. (College of Physicians and Surgeons, New York City), 1859. In December of 1859 he went as missionary to the Arcot mission, southern India, and has ever since labored in its service. He is recognized as one of the master missionaries, and is an orator of kindling enthusiasm. His medical and surgical skill is of a high order, but he makes the service to the soul his chief concern. His linguistic attainments are remarkable and he has played a prominent part in translating the Scriptures into Telugu. In English, he has published *A Home, or Christian Giving* (1879); *Break Cocoanuts Over the Wheels: or, All Pull for Christ* (1885); *Native Churches and Foreign Missionary Societies* (1879); *Winding Up; In the Tiger Jungle* (1896); *The Cobra's Den and Other Stories of Missionary Work Among the Telugus of India* (1900).

CHAMBERLAIN, Joseph (1836—). A British Liberal Unionist and Imperialist statesman. He was born in London, July, 1836, and was educated at the University College School. He entered the screw-manufacturing firm of Nettlefold & Chamberlain, Birmingham, and retired in 1874, shortly after the death of his father, one of the partners. He early distinguished himself in local debating societies by his radical opinions and fluency of speech. In 1868 he was named president of the first executive committee of the National Educational League, held in Birmingham (q.v.), and the same year was elected town councilor. He became very popular in the northern industrial centres; was three times elected mayor of Birmingham, 1873-76, and chairman of the school board, 1874-76. His mayoralty was marked by numerous city improvements and embellishments, accomplished against much opposition. After an unsuccessful contest in Sheffield, 1874, he entered Parliament, in 1876, on a Birmingham by-election, and soon achieved distinction. He was returned at the general election in 1880, and appointed president of the Board of Trade by Gladstone, with membership in the Cabinet. He was instrumental in reforming the bankruptcy laws and unsuccessfully attempted to amend the navigation laws. His influence increased throughout the nation by his advocacy of popular reforms, including a plan for the 'restitution' of land, the 'ransom' of property, and the consequent regeneration of the masses. He was recognized as the leader of the Radical Party, and at the general election in 1886 was elected to Parliament by West Birmingham. He became president of the Local Government Board, but resigned in March, because of his antagonism to Gladstone's Home Rule Bill, and with Lord Hartington he organized the Liberal Union Party, which supported the Conservatives. He was fiercely assailed by Home Rulers as a renegade. In 1887 his visit and speeches in Ulster strengthened the Union cause there. The following year he went as chief commissioner to Washington, and effected an agreement concerning the Canadian fisheries dispute. He was married on November 15, 1888, to Miss Endicott, daughter of President Cleveland's War Secretary. When Lord Hartington became Duke of Devonshire (December, 1891), Chamberlain succeeded him as leader of the Liberal Union Party in the Commons. In 1895 he was appointed Colonial Secretary in the Marquis of Salisbury's 'coalition' Ministry, and showed untiring energy in developing the commercial interests of the colonies. In 1896 his firmness settled the Ashanti trouble without bloodshed, and his decision and effective diplomacy safely steered his office through the Transvaal imbroglio over the Jameson raid, and the intrigues in which Cecil Rhodes's South Africa Company had almost involved the home Government. He was incriminated as an accessory, but as a self-appointed witness explicitly denied the charge, and, notwithstanding subsequent foreign journalistic affirmations and investigations, no conclusive evidence was produced to show the complicity of any one connected with his office. In 1897 his able coöperation secured the passage of the Workmen's Compensation Act. In 1898 he strongly advocated an Anglo-American alliance. With a predilection for the 'new' or American diplomacy, which startled European circles in that year, his straightforward utterances on foreign affairs brought upon him the vituperation of Russia over his 'long spoon' speech on the Port Arthur and Talien-wan occupation. This was followed by the indignation of the French (1899) over the threat he made regarding their ill manners, as shown in the caricatures of the Queen; and by the anger of the Germans, whose treatment of their prisoners in the Franco-German War he had compared with that of the British in the conflict with the Boers. He persistently urged the claims of the Uitlanders on the Transvaal Government, and conducted the negotiations which ended in the invasion of Natal by the Boers of the Transvaal and their allies, the Free Staters. He was reëlected to Parliament against opposition in 1900, and defended his South African policy on the grounds of expediency and justice, predicting its ultimate triumph. In the Commons, the minority, disclaiming malice, attempted his aspersion by an insinuation of personal interest in governmental war contracts, which his self-possessed defense, cool and cynical in its aggressiveness, easily disposed of. He received a strong majority support, and, reappointed Colonial Secretary, systematized a plan of reconstruction for the Boer country which received ministerial approval and popular indorsement. His concessions to Canada's commercial autonomy and his measures for the constitution of the Australian Commonwealth have been special features of his colonial administration. On the retirement of Lord Salisbury, and the succession of Balfour, he was continued in the same office. He has received academic honors, D.C.L., Oxford; LL.D., Cambridge; and in 1896 was elected Lord Rector of Glasgow University. Mr. Chamberlain has occasionally contributed to periodical literature. Consult: Chamberlain, "Municipal Institutions in America and England. Comparison of Birmingham and Boston," in Vol. I., xiv., *Forum* (New York, 1892); Morris. *The Right Hon. Joseph Chamberlain* (New York, 1901): and Jeyes, *Joseph Chamberlain* (London, 1896).

CHAMBERLAIN, Joshua Lawrence (1828—). An American soldier and educator. He was born in Brewer, Me., graduated at Bowdoin College in 1852, and at the Bangor Theological Seminary in 1855, and was professor of modern languages at Bowdoin when the Civil War broke out. He then enlisted in the Union Army and served with distinction throughout the war, was six times wounded, and left the service (1865) with the brevet rank of major-general. From 1866 to 1870 he was Governor of Maine, and in 1871 was chosen president of Bowdoin College. When the Democrats and Fusionists, under the lead of Governor Garcelon, undertook in 1879-80 to get possession of the State government, and there was some danger of civil war, General Chamberlain commanded the militia of the State. He adhered to the regularly elected Legislature, as sustained by the unanimous opinion of the Supreme Court, and prevented the intended violence and usurpation. He resigned the presidency of Bowdoin in 1883, and removed to New York to practice law. He has written *Maine: Her Place in History* (1877); *American Ideals, and Ethics and Politics of the Spanish Question,* and is the editor of an extensive work entitled *Universities and Their Sons* (1898).

CHAMBERLAIN, Mellen (1821-1900). An American librarian and historical writer. He was born in Pembroke, N. H., graduated at Dartmouth in 1844 and at the Harvard Law School in 1848, and in 1849 began the practice of the law in Chelsea, Mass. He subsequently served for some years in the Massachusetts Legislature; was chairman of the Judiciary Committee in the Senate; became a justice of the Boston Municipal Court in 1866; and from 1870 to 1878 was Chief Justice. From 1878 to 1890 he was librarian-in-chief of the Boston Public Library. He devoted much of his time to the study of American history, and wrote a number of monographs and essays of considerable value, some of which were collected into a volume entitled, *John Adams, the Statesman of the Revolution, and Other Essays* (1898). Among his other publications are: *The History of Winnisimmet, Rumney Marsh, and Pullin Point* (1880); *The Journals of Captain Henry Dearborn, 1775-83* (1886-87): and several chapters, notably the one entitled "The Revolution Impending," in Winsor's *Narrative and Critical History of America* (Boston, 1884-89).

CHAMBERLAIN, Montague (1844—). A Canadian ornithologist, born at Saint John, New Brunswick. In 1890 he became recorder of Harvard University, and in 1893 secretary of the Lawrence Scientific School. He was one of the founders of the American Ornithological Union. Besides a revision of *Nuttall's Handbook of the Birds of Eastern North America* (1872), he has published the following important works and lectures: *Catalogue of Birds of New Brunswick; Catalogue of Mammals of New Brunswick; Systematic Table of Birds of Canada; Birds of Field and Grove; Song Birds of New England; Birds' Nests; Mental and Moral Characteristics of the Indians; Past, Present, and Future of the Indians.*

CHAMBERLAIN, Sir Neville Bowles (1820-1902). An English soldier, born in Brazil. He entered the Indian Army in 1837, and served throughout the Afghan war of 1839-42, during which he was six times wounded. In 1842 he was attached to the Governor-General's bodyguard, with which he, in 1843, participated in the battle of Maharajpur. He was promoted to be lieutenant-colonel, commanded the Punjab frontier force from 1854 to 1857, in the latter year became adjutant-general of the Indian Army, and during the Mutiny (1857-58) distinguished himself, being present at the taking of Delhi. He was commissioned lieutenant general in 1872, full general in 1877, and field-marshal in 1900. In 1876-81 he was commander-in-chief of the Madras Army, in 1878 was a member of a special mission to the Ameer of Afghanistan, and for some time was military member of the Council of the Viceroy of India. It was said of him before his retirement from active service that he had been more often wounded than any other officer of the British Army.

CHAMBERLIN, Thomas Crowder (1843—). An American geologist, born at Mattoon, Ill. He graduated in 1866 at Beloit College, studied science at Michigan University, and from 1869 to 1873 was professor of natural science at the State Normal School, Whitewater, Wis. From 1873 to 1884 he was professor of geology at Beloit College, and from 1887 to 1892 was president of the University of Wisconsin. In 1892 he took charge of the geological department of the University of Chicago, and later became editor of the *Journal of Geology*. In 1873-76 he was assistant State geologist for Wisconsin, in 1876-81 was chief geologist, and in 1882 was a United States geologist in charge of the glacial division. While engaged in this active geological work he collected and published a large amount of new material relative to the character of the glacial deposits in the Northern States, upon which he based some interesting theories. He has also made a study of modern glaciers, with valuable scientific results. He was geologist of the Peary Arctic relief expedition in 1894. His publications include *Outline of a Course of Oral Instruction* (1872), *Geology of Wisconsin* (1877-83), and many geological papers.

CHAMBER MUSIC. A term used to designate music that is specially adapted for performance in a room. The name originally comprised both vocal and instrumental music, not intended for the church; but it is now almost restricted to the various combinations of the pianoforte with strings or strings alone, as duos, trios, quartets, quintets, etc. Chamber music is the most delicate, refined, and perfect branch of the art, the size of the small auditorium allowing of the most exquisite shadings and nuances. The greatest masters of music have left some of the world's richest musical legacies in their chamber music.

CHAMBER OF COMMERCE. A body of merchants and traders, associated for the purpose of promoting the interests of its own members, of the town or district to which the society belongs, and of the community generally, in so far as these have reference to trade and merchandise. Of the means by which these objects are sought to be accomplished, the following may be mentioned as the most prominent: (1) By representing and urging on the legislature the views of their members in mercantile affairs; (2) by aiding in the preparation of legislative measures having reference to trade, such, for example, as the bankrupt acts: (3) by collecting statistics bearing upon the staple trade of the district; (4) in some places, by acting as a sort of court of arbitration in mercantile questions; (5) by attaining, by combination, advantages in trade which might be beyond the reach of individual enterprise.

Chambers of Commerce originated on the Continent of Europe, when, with the gradual disintegration of the old guild system, they were clothed with some of the municipal and administrative functions which had in earlier times been exercised by the craft guilds. The first of these organizations on record is that of Marseilles, which was originally established about the year 1600, and acquired a definite organization in 1650. Similar bodies were created at Dunkirk in 1700, and in the following year at Rouen, Toulouse, Lyons, Bordeaux, and other points. During the Napoleonic period, when the French influence extended to Holland, Germany, Austria, and Italy, similar organizations were established in the principal cities of those countries. Before this time they had spread to Scotland, where the year 1783 witnessed the establishment of the Glasgow Chamber of Commerce, and to the American Colonies, where the New York Chamber of Commerce was organized in 1768. It was not until the early part of the Nineteenth Century that the institution took root in England. The Chamber of Commerce of Manchester was organized in 1820, but that of London not until 1882. At the present time such organizations, whether under the original name of Chamber of Commerce or under that of Board of Trade, are well nigh universal, and no town of any considerable importance lacks such a corporate representation of its mercantile interests.

In the United States, and in England and her colonies, Chambers of Commerce are purely voluntary associations. They select their own members and are accountable to no one for their actions. Their sole purpose is to render themselves serviceable to mercantile interests, by such action as will influence public opinion and law-making bodies. In European countries they have a somewhat more official character. They are there elected bodies chosen by ballot among the mercantile classes. The law prescribes who shall have the right to participate in such elections. In some countries it is made their duty to express their opinion in advance upon proposed legislation, and in the Hanse cities they must by law be consulted before certain kinds of legislation can be considered. They are also intrusted frequently with minor administrative duties, such as the prescribing of port regulations and the like.

CHAMBERS (OF. *chambre*, *cambre*, It. *camara*, Ger. *Kammer*, OHG. *chamara*, chamber, from Lat. *camera*, room, Gk. *καμάρα*, *kamara*, room with vaulted ceiling: connected with Lat. *camur*, crooked, Gk. *κάμπτειν*, *kamptein*, to bend, Ir. *cam*, crooked). In law, the private room or office of a judge in which he hears motions, signs papers, or does other business pertaining to his office. A judge is said to act at 'chambers' when any legal proceeding is carried on before him out of court, either at his office or residence, or other convenient place, including the court-room itself, provided he is acting as a judge of the court and not as the court itself.

In general, *ex parte* proceedings and proceedings incidental to an action or to the main proceeding may be carried on at chambers. Modern statutes have increased materially the business which may be transacted in this manner; and the codes of civil procedure adopted in several of the United States expressly provide that certain acts may be done by the *court*, and others by a *judge* of the court.

Under the English statutes, 16 Victoria, ch. 80, and 36 and 37 Victoria, ch. 66, the office of master in chancery (q.v.) was abolished, and the business formerly transacted by him was directed to be transacted under the direction of a judge at chambers by officers of the court. Consult: the authorities referred to under PRACTICE: also Coe, *Practice at the Judges' Chambers, Queen's Bench*, etc. (London, 1876). See MASTER IN CHANCERY.

CHAMBERS, chām'bērz, CHARLES HADDON (1860 —). An English playwright. He was born April 22, 1860, and educated at Sydney, N. S. W., where he entered the civil service in 1875. Two years afterwards he turned for a time to a life of more adventurous experiences in the 'bush.' His first visit to England was in 1880, and in 1882 he went to London to engage in literary work. His first work was in the way of articles and stories for the periodicals, but about 1886 he began dramatic writing. After several minor achievements, he made his first great success with *Captain Swift*, which was produced at the Haymarket Theatre, June 20, 1888. Since then he has written *The Idler*, first produced in New York at the Lyceum Theatre, and a few weeks later at the St. James, London (1891); *The Honorable Herbert* (Vaudeville, 1892); *John a' Dreams* (Haymarket, 1894); *The Tyranny of Tears* (1899), and other plays.

CHAMBERS, EPHRAIM (1680-1740). An English encyclopædist. In early life he was an apprentice to a map and globe maker in London, where he formed the plan of compiling an encyclopædia on a larger scale than that of John Harris's *Lexicon Technicum* (1704), then the only work of the kind in the language. He published by subscription the first edition of his *Cyclopædia, or an Universal Dictionary of Arts and Sciences*, in 1728. Ten years later the second edition appeared, and in the year following the third. The fourth was issued in 1741, a year after the editor's death, and many other editions have since been issued. A French translation of it gave rise to Diderot's and D'Alembert's *Encyclopédie*. It was also expanded into Dr. Rees's once well-known *Encyclopædia*. Chambers was an avowed freethinker, irascible, kind to the poor, and extremely frugal.

CHAMBERS, ROBERT (1802-71). A Scotch publisher and author, born at Peebles, Scotland, July 10, 1802. He attended the grammar school, where he learned Latin; and at home read through the fourth edition of the *Encyclopædia Britannica*. The family moved to Edinburgh in 1813, where, five years later, Robert set up as a book-seller, read extensively, and began writing.

His *Traditions of Edinburgh* (1823) procured him the friendship of Sir Walter Scott, who contributed various memoranda for the work. It was followed by a large number of books, among which are *Popular Rhymes of Scotland* (1826), *Picture of Scotland* (1826), and *History of the Rebellions in Scotland* (1828-29). He also edited *Scottish Ballads and Songs* (1829), the *Biographical Dictionary of Eminent Scotsmen* (4 vols., 1832-34), and many other collections. The success of *Chambers's Edinburgh Journal*, founded in 1832 by his brother, William Chambers, was materially promoted by his many essays, moral and humorous. His great work, however, is the *Vestiges of the Natural History of Creation*, published anonymously in 1844. It is a brilliant exposition of development in the natural world, and it prepared the public for the theories of Darwin. Among his later works are *Ancient Sea Margins* (1848), *Life and Works of Robert Burns* (1851), *Domestic Animals of Scotland* (1859-61), and *The Book of Days*, a miscellany (1863). Ever since 1832, he had been a member of the firm of William and Robert Chambers, printers and publishers. In 1863 he received from Saint Andrews the degree of LL.D. He died March 17, 1871. A collection of his miscellaneous papers appeared in seven volumes (1847).

CHAMBERS, Robert William (1865—). An American painter and author, born in Brooklyn, N. Y. He pursued art studies abroad, first exhibited at the Paris Salon of 1889, and subsequently worked as an illustrator for New York weeklies. Since 1893 he has devoted himself chiefly to literature. His writings include a drama, *The Witch of Ellangowan*, numerous short stories contributed to magazines, and several volumes of fiction, among them *The King in Yellow* (1893); *Lorraine* (1896); *The Cambric Mask* (1899); *The Conspirators* (1900); and *Cardigan* (1901).

CHAMBERS, Talbot Wilson (1819-96). An American clergyman. He was born at Carlisle, Pa., graduated in 1834 at Rutgers College, studied in 1836-37 at Princeton Theological Seminary, and in 1838 was licensed to preach. From 1839 to 1849 he was pastor of the Second Reformed Dutch Church, Somerville, N. J., and from 1849 to 1871 one of the pastors of the Collegiate Dutch Church of New York City. He was a member of the Old Testament Company of the American Bible Revision Committee. He published *The Noon Prayer-meeting in Fulton Street* (1857); *Memoir of Theodore Frelinghuysen* (1863); expositions of Amos and Zechariah (in the Schaff-Lange *Commentary*, 1874); *The Psalter: A Witness to the Divine Origin of the Bible* (1876); and a *Companion to the Revised Version of the Old Testament* (1885).

CHAMBERS, William (1800-83). A Scotch publisher and author, elder brother of Robert Chambers. He was born at Peebles, April 16, 1800, and as a boy and youth passed through experiences similar to his brother's. He began business as a bookseller in Edinburgh (1819) and afterward added printing. Between 1825 and 1830 he wrote the *Book of Scotland*, and, jointly with his brother, the *Gazetteer of Scotland*. On February 4, 1832, he issued the first number of *Chambers's Edinburgh Journal*, the first of a class of popular periodicals of a wholesome kind, now so generally diffused. From the first the venture was a success, and soon the circulation of the weekly journal reached 80,000. The two brothers now (1832) established the firm of W. & R. Chambers, in which they were united in writing, editing, and printing a long series of works designed for popular instruction. Among them are *Information for the People* (2 vols.); the *Educational Course* (250 vols.); *Cyclopædia of English Literature* (2 vols.); *Miscellany of Useful and Entertaining Tracts* (20 vols.); *Papers for the People* (12 vols.); and the well-known *Cyclopædia* (10 vols., 1859-68). In conducting these laborious undertakings, the firm necessarily depended upon many assistants. Among William Chambers's independent works are, *Things as They Are in America* (the result of a visit to the United States in 1853); *The Youth's Companion and Counsellor; History of Peebleshire; Ailie Gilroy; Stories of Remarkable Persons; Stories of Old Families;* and *Historical Sketch of Saint Giles's Cathedral.* In 1849 he acquired the estate of Glenormiston in Peebleshire, and a few years afterwards founded and endowed an institution in his native town for social improvement. Twice elected Lord Provost of Edinburgh, he occupied that office for four years (1865-69), during which he promoted several important public acts, including one for the improvement of the older part of the city. In recognition of his great services, the University of Edinburgh conferred upon him the degree of LL.D. (1872). He died May 20, 1883, and Robert Chambers (1832-1888), eldest son of the Robert Chambers named above, became editor of the *Journal* and head of the firm. On his death, in 1888, he was in turn succeeded by his son, Charles Edward Stuart Chambers (1860-—), who is also a well-known editor. Consult Chambers, *Memoir of W. and R. Chambers* (Edinburgh, 1872; 13th ed., with additions, 1884).

CHAMBERS, Sir William (1726-96). An English architect. He was born in Stockholm, but was brought to England in his infancy. In his youth, as a supercargo in the service of the Swedish East India Company, he made a voyage to China, and there produced sketches, which were published under the title *Designs for Chinese Buildings*. At the age of 18 he left the sea, and studied architecture in Italy and Paris. He returned to England in 1755, and became the foremost living English architect, continuing the propaganda for the Palladian style begun by Inigo Jones. His masterpiece is the remodeling of Somerset House in 1776. He also designed buildings for Kew Gardens, the pagoda among them. He wrote several books, including a *Dissertation on Oriental Gardening*, in which he praised extravagantly the Chinese artificial system of laying out grounds. The book called forth several keen satires, of which the most widely circulated was *An Heroic Epistle to Sir William Chambers*, probably written by William Mason. It is said that Horace Walpole had a hand in it also. Chambers's high reputation as a writer rests upon his standard work for classic architecture, *A Treatise on the Decorative Part of Civil Architecture*. He was created Knight of the Polar Star by the King of Sweden (1771), and George III. permitted him to use his title in England.

CHAMBERSBURG. A borough and county-seat of Franklin County, Pa., 52 miles southwest of Harrisburg; on Conococheague Creek; and on the Cumberland Valley, Western Maryland, Philadelphia and Reading, and other railroads (Map: Pennsylvania, D 4). It is finely situated in the broad Cumberland Valley, in the midst of a populous and well-cultivated region, and is well built. Chambersburg is the seat of Wilson College (Presbyterian) for women, organized 1870; it has a court-house, a memorial fountain, and many handsome churches, while in the vicinity are Wolf Lake, Mont Alto, and Pen-Mar parks. There are manufactures of shoes, hosiery, flour, furniture, wool, dresses, gloves, paper, iron, milling machinery, engines, and boilers; and the shops of the Cumberland Valley Railroad are located here. The city owns and operates its water-works and electric-light plant. Its government has its source in special acts of the State Legislature, which provide for a chief burgess, elected every three years, and a borough council. Population, in 1890, 7863; in 1900, 8864.

Chambersburg was first settled (in 1730) by Benjamin Chambers, an immigrant from Ireland, and was for many years called "Falling Spring." It was incorporated in 1803. On July 30, 1864, the Confederate General McCausland burned the town in default of the payment of a ransom of $100,000. It was entirely rebuilt after the war. Consult *History of Franklin County* (Chicago, 1887).

CHAMBERTIN, shäɴ'bâr'täɴ'. A red wine of Burgundy, which is famous for having been a favorite with both Louis XIV. and Napoleon. The grape is grown on the hills near Dijon and the vineyard (Chambertin) is divided among several proprietors. See WINES.

CHAMBÉRY, shäɴ'bā'rē'. The capital of the French Department of Savoie, situated in an elevated valley about six miles south of Lake Bourget, at an elevation of over 800 feet (Map: France, N 6). It contains a cathedral dating from the Fifteenth Century and a number of interesting old churches. Its castle, which was repeatedly demolished by fire, has been restored, and is now used by the administrative authorities of the department. There are also a museum, a fine library, a number of institutions for higher and secondary education, and a theatre. The chief industries are the manufacture of lace, silk fabrics, leather, and soap. Population, in 1901, of town, 15,683; of commune, 22,108.

CHAMBE'ZI. A river of Africa, one of the head-streams of the Congo (Map: Congo Free State, F 5). It rises in the plateau between the lakes of Tanganyika and Nyassa and, flowing southwest, enters Lake Bangweolo in the wet season, but during the dry season skirts the southern border of the shrunken lake and flows directly into the Luapula River.

CHAMBIGES, shäɴ'bēzh', MARTIN (?-1532). A French architect of the late Gothic period. He built parts of three of the finest cathedrals in France—Sens (transept, 1494; portals, 1501-13), Troyes (façade, 1502), and Beauvais (transept, 1500-32)—and was one of the few really great architects of his age. His son, PIERRE CHAMBIGES, besides assisting his father, took part in the building of the Hôtel de Ville, in Paris (1533-34), and of the Château de Fontainebleau (1538), but his claim to originality rests on the remarkable Château de Saint Germain, which stands between the Gothic and Classic styles, and between Feudal and Renaissance castles, in a style peculiar to itself.

CHAMBLY (shäɴ'blē') **RIVER.** See RICHELIEU.

CHAMBORD, shäɴ'bōr'. A celebrated castle of the Renaissance in France. It is situated in the Department of Loir-et-Cher, about 12 miles east of Blois, in the midst of a park 21 miles in circumference. It was begun by Francis I. in 1526, and was continued by his successors of the houses of Valois and Bourbon. The building marks the transition between the fortified castle and the Italian palace, and is surmounted by a vast number of turrets, minarets, and cones. The most prominent features of the structure are its six round towers, each 60 feet in diameter. The double spiral staircase in the central tower is so contrived that persons ascending and descending may pass each other without meeting. The castle, which contains 440 chambers, was the residence of Francis I., Henri II., and Louis XIV., and the scene of the first presentation of Molière's *Bourgeois gentilhomme*. Among the other occupants of Chambord were Marshal Saxe, Stanislas Leszczynski, King of Poland, and Marshal Berthier, upon whom it was bestowed by Napoleon. In 1821 it was bought from Berthier's widow by a number of Legitimists and presented to the infant Duc de Bordeaux, who was afterwards known as the Comte de Chambord. Consult Millot, *Les châteaux historiques: Chambord* (Paris, 1875).

CHAMBORD, HENRI CHARLES FERDINAND MARIE DIEUDONNÉ D'ARTOIS, Duc de Bordeaux, Comte de (1820-83). A Bourbon claimant to the French throne. He was the son of the Duc de Berry, who was murdered by Louvel on February 13, 1820, and the grandson of Charles X. Seven months after the death of the Duc de Berry, who was heir presumptive to the throne of France, his widow gave birth to a prince, who received the title of Duc de Bordeaux—that of count, by which he was subsequently known, being derived from the castle of Chambord (q.v.), presented to him at his christening. He was baptized amid circumstances of great pomp, with water brought by Chateaubriand from the River Jordan, and received the appellation of *l'enfant du miracle*. Chambord was chosen by Charles X. to succeed him when, in 1830, he abdicated the French throne; and at the death of Charles the Legitimists proclaimed Chambord king. In 1839 the prince visited Italy, accompanied by his mother, and was received by the petty courts with great distinction. After the death of the Duc d'Angoulême, in 1844, the heads of the different factions of Legitimists met in London to pay their united homage, and the Duc de Bordeaux made a "pilgrimage to Belgrave Square" to receive it. In 1846 he married a sister of the Duc de Modena, who had never acknowledged the monarchy of July. After the Revolution of 1848 many Legitimists were returned to the National Assembly, and in 1850 the Comte de Chambord appeared at Wiesbaden, where a congress of his adherents assembled to consult as to their future policy. As the Comte de Chambord was without heirs, a union of the partisans of the elder Bourbons with the Orleanists was effected, but no attempts were made to carry out the arrangement. After the fall of Napoleon III., in 1870, repeated attempts were again made to effect a coalition between the supporters of the Bourbons and the Orleanist claims; but whatever chance there might have been for a royal restoration during the troubled days of the Third Republic before 1880 were ruined by the Comte de Chambord's obstinate refusal to abandon his extreme Legitimist views, which he aired more than once in 'royal' proclamations. He died at Frohsdorf, in Lower Austria, which had been his residence for many years, August 24, 1883.

CHAMBRE ARDENTE, shäɴ'brär'däɴt' (fiery room). A tribunal established by Francis I. in 1535 for the trial and execution of heretics apprehended by the Inquisition. It derived its name from the manner of execution, which was chiefly by burning. It flourished during the civil wars and the time of the League, but sank into abeyance under the early Bourbons. Louis XIV., however, employed it in the investigation of the numerous reports of poisonings that followed the apprehension of the Marquise de Brinvilliers (q.v.). It was discovered that a certain hag named La Voisin, posing as a sorceress, had been driving a lively trade in poisons—'succession powders,' they were called—with such as were afflicted with superfluous husbands, fathers, or rival heirs. Many persons of the highest Court circles, the Marshal Luxembourg among them, were summoned before the tribunal, but the affair ended with the execution of the sorceress only, in 1680. With this the Chambre Ardente ceased its activity. Consult Weiss, *La chambre ardente* (Paris, 1889).

CHAMBRE DES DÉPUTÉS, shäɴ'br' då då'pụ'tå'. The building in Paris in which the sessions of the French Legislature are held. It is called also 'Palais du Corps Législatif' and 'Palais Bourbon,' and was built in 1722 for the Duchess of Bourbon, becoming national property in 1790. It fronts the Seine opposite the Pont de la Concorde. The style is that of a Greek temple, with twelve Corinthian columns. The steps and façade are ornamented with statues and reliefs.

CHAMBRE INTROUVABLE, shäɴ'bräɴ'troo͞'vä'bl'. The name given to a packed assembly of deputies in France which sat from October, 1815, to April, 1816. The epithet (meaning "chamber whose like cannot be found") originated with Louis XVIII., by whom, after his restoration, this chamber had been summoned. Louis, no doubt, used the term ironically, for he realized the injury which was sustained by his cause through the fanaticism of these deputies; but they, for the most part, accepted the name seriously as a compliment. The former chamber, which had shown much moderation, had been dissolved under the influence of the Court party, and the Ministry, led by Talleyrand, had exerted itself to procure the election of a submissive chamber. The ultra-Royalists were for a time in the ascendent. The number of the deputies was arbitrarily raised from 259 to 392, and many of the elections, especially in the south, took place under the supervision of the partisans of reaction or of foreign troops. At the elections in Nîmes more than 100 persons were killed by the Royalist bands. At last, on October 7, the King opened the chamber, on which he enjoined quiet and moderation; but when, in one of the first sittings, Boyer d'Argenson asked for the intervention of the chamber in behalf of the Protestants, who were being slaughtered in the south by the ultra-Royalist bands, the speaker was called to order, and the chamber from that time ceased to observe any bounds or moderation. The fanatical legislation that followed inspired the ministers, the King, and especially the Emperor Alexander, with so much aversion and fear that the Chamber was dissolved on April 5, 1816, an event which was received with universal rejoicing. The electoral law of February 5, 1817, prevented the return of a similar chamber, and it was by the modified electoral law of 1820 that ultra-Royalism regained a predominating influence in the Parliament. See WHITE TERROR.

CHAMBURU. A species of papaw (q.v.), native of Brazil.

CHAMECK, shä-měk' (Brazil). The coaita. See SPIDER-MONKEY.

CHAMELEON, kȧ-mē'lê-ŭn (Lat. *chamæleon*, Gk. *χαμαιλέων*, *chamaileōn*, from *χαμαί*, *chamai*, on the ground + *λέων*, *leōn*, lion). An African lizard of the family Chamæleontidæ, of very peculiar form and structure, and placed at the head of the order Lacertilia. The body is much compressed, the dorsal line sharp, in some of the species rising into an elevated crest; the back of the head is also elevated into a sort of cone. The neck is very short, and does not admit of the head being turned, for which, however, compensation is found in the remarkable powers of motion possessed by the large, prominent eyes, which move independently of one another, and are covered with a membrane pierced only with a small hole for the pupil to look through. There are no external ears. The skin is not covered with scales, but, like shagreen, is rough with granules. The legs raise the body rather higher than in most of the saurians; the toes, both of the fore and hind feet, are divided into two sets, one directed forward and the other backward, so that each foot has the power of grasping like a hand. The tail is long and prehensile. The lungs are very large, and are connected with air-cells that lie among the muscles and beneath the skin, so that the animal has a remarkable power of inflating itself with air. The tongue is remarkably extensile, and is the organ by which the animal seizes the insects which constitute its food, being darted at them with unerring aim, while a viscous saliva causes them to adhere to it, and they are carried with it into the mouth.

The chameleons are slow in their movements, except those of the eyes and the tongue, and remain long fixed in one spot, awaiting the approach of insects, which they seize on their coming within reach. They all live among the branches of trees, but lay their large eggs (10 or 12) under leaves on the ground. Their power of fasting is great, and, along with their gulping of air, gave rise to the fable, current among the ancients and until recent times, of their living on air, and led to other fables and to their ancient use in medicine. Their celebrated power of changing color is not equally fabulous, and may be used to render the animal less easy of observation, by assimilating it to the color of surrounding objects. It may depend in part on the action of light; it is certainly connected with the fear and other passions of the creature. Milne Edwards has discovered that it depends upon the presence of two differently colored layers of pigment underneath a transparent skin. Both may show simultaneously, or blend, or one may replace the other. This power of changing color is possessed by many lizards, and is explained more fully under METACHROSIS. One species (*Chamæleon vulgaris*) is found wild along the European shore of the Mediterranean, and is often made captive.

American Chameleons are the small, slender lizards of the iguanid genus Anolis, very common throughout tropical America and represented in the southern United States by a single species (*Anolis principalis*), often also called 'scorpion.' It is 3 to 3½ inches long in body, with a tail 5 to 6 inches long. Below it is white, above emerald-green, or the color of any natural object upon which it rests. Beneath the capacious mouth is a large dewlap, which "can be vertically expanded like a fan, when it is of a deep-red shade, or may be retracted so as to be scarcely visible." They are extremely active during the warm hours of the day, and extremely amusing as they dart and scramble about bushes, rocks, or buildings in search of insects, of which they destroy a vast number. In Jamaica and the Antilles they are often household pets. A closely allied tropical species is illustrated on the Colored Plate of LIZARDS.

CHAMELEON. A southern constellation within the Antarctic polar circle.

CHAMFER (OF. *chamfrein, chamfrain*, of uncertain origin). In architecture, an angle or arris which is obliquely beveled or cut off is said to be chamfered. The chamfer is sometimes a *concave* or *hollow* chamfer; when it does not extend over the entire length of the arris it is called a *stopped* chamfer. It was most used in mediæval architecture, and in Gothic buildings it is greatly varied and decorated.

CHAMFORT, shäɴ'fôr', SÉBASTIEN ROCH NICOLAS (1741-94). A French epigrammatist, the best talker of his generation in France. He was born in Auvergne, an illegitimate child, was educated on a scholarship in Paris, and achieved a distinction in classic studies that led him in after-years to write. "What I learned I have forgotten. The little that I do know I have guessed." He left school to become an abbé, "a costume, not a profession," he said, adding when offered a benefice that he "preferred honor to honors." For the moment, however, he got neither. Booksellers declined his books, and for a year he lived by writing other people's sermons and on chance journalistic crumbs. Then he won an academic prize and became the fashion in the literary salons, where he led a life of gallantry from which he had presently to seek rest and recuperation at Spa and elsewhere. Returning, he wrote a successful drama, *La jeune Indienne* (1764). He made a living, scanty to be sure, more by his tongue than by his pen, paying for his entertainment by the entertainment that he gave to his hosts, especially Madame Helvétius, and Chabanon, who resigned to him a pension of 1200 livres on the *Mercure de France*. Occasionally he won academic prizes, as by his eulogies on Molière and Lafontaine. But with every epigram his reputation grew. The King added 1200 livres to his pension and the Prince de Condé made him his secretary, a post that he found uncongenial to his bohemianism. He withdrew to Auteuil, and married a clever woman of forty-eight, who died six months after. Then he went to Holland, but returned to accept a seat in the Academy in 1781. An unfortunate and mysterious love affair soon made him quit the Court forever, but he gathered about him at the house of M. de Vaudreuil a congenial circle, which included Mirabeau, whom Chamfort helped with his orations. He worked actively for the Revolution with tongue and pen, for a time as secretary of the Jacobin Club and as street orator. He was with the stormers of the Bastille. But with the fall of the Girondists his political life ended and his criticisms of the Terrorists soon made them anxious to silence his bitter tongue with the guillotine. This he escaped by suicide with dagger and pistol. He did not die immediately, however, but lived to bequeath to the world two final epigrams. "I declare," he dictated to the police who came to arrest him and signed with his blood, "that I wished to die free rather than be led slave to prison." To Abbé Siéyès, who owed his political fortune to Chamfort's epigram on the Third Estate, "It is everything and has nothing," he said, as his last word, "I am going at last from a world where the heart must either break or turn to bronze." No writing of Chamfort's is worth recalling save his aphorisms (*Maximes et pensées*), which, after those of La Rochefoucauld, are the keenest and most incisive, the most pregnantly cynical of modern literature. They are restrained in utterance, violent in implication, subtle in manner, iconoclastic in effect. Chamfort's *Works* form five volumes (1824-25); his select *Works* (1852) have a critical preface by Houssaye. Consult: Sainte-Beuve, *Causeries du lundi*, Vol. IV. (Paris, 1857-62); and Pelisson, *Chamfort, Etude sur sa vie, son caractère et ses écrits* (Paris, 1895).

CHAMFRON, or **CHAMPFRAIN** (Fr. *chanfrein*, of uncertain origin). A frontlet of metal, forming part of the armor worn by a charger in late mediæval times. It protected the forehead, eyes, and nostrils, and was frequently provided with a projecting spike. It came into use about the beginning of the Fourteenth Century. In the Fifteenth Century the chamfron was sometimes adorned with precious metals and became an object of great cost. To prevent shying in tourneys, the chamfron was often made so that the horse could see nothing in front of him.

CHAMIDÆ, kăm'i-dē (Neo-Lat. nom. pl., from Gk. *χαίνειν, chainein*, to gape). A group of curious marine Pelecypoda, allied to the genus Cardita, and having shells with unequal valves, that exhibit a tendency to spiral development of the beaks. In the recent forms, and many of the fossil representatives, which are far more numerous than those now living, one of the valves is attached to some supporting object by direct cementation of the outer wall of the valve, and there is usually a considerable thickness of the shell-wall of this valve. The only living genus, Chama, is less different from the normal clam form, as seen in Cardita, than are its numerous fossil relatives from the Mesozoic and Tertiary rocks. Chama has a shell of which the larger (attached) valve is convex with a somewhat spiral non-elevated beak, and a smaller spiral flattened valve that suggests a lid for the larger one, which latter contains in its cavity the bulk of the animal. This genus, with about fifty-five living species, is found abundantly in warm seas, especially the Red Sea and the Indian Ocean, where its shells are common on coral reefs, fastened into the cavities of the coral masses. Fossil species of Chama, little different from the modern forms, are found first in the Cretaceous rocks, and the genus attained its maximum in the Eocene, when it was quite abundant in the European Mediterranean Sea of that period. The related fossil genera, found in the Mesozoic rocks, present some curious forms, due to extreme inequality or to spiral extension of the beaks of the valves. Diceras, of the Upper Jura, has the two valves of slightly unequal size, with their beaks twisted spirally outward, so that they resemble a pair of ram's horns. Requienia, of the Cretaceous, resembles a turreted gastropod with the aperture of its spirally rolled larger (left) valve closed by the operculum-like flattened right valve. Other allied genera are Monopleura, Caprina, etc., all from the Cretaceous rocks. For description of similar and closely allied, though even more aberrant, fossil pelecypods, see the articles on HIPPURITES; and, for illustrations, see RUDISTÆ.

CHAMIER, shȧ-mēr′, FREDERIC (1796-1870). An English novelist. He was born in London, entered the navy in 1809, and distinguished himself in the American War of 1812. He retired in 1833 and was promoted captain in 1856. The success of Marryat in depicting sea life led Chamier to enter the same field, in which he was not without success, though in invention and humor he falls short of his model. His best romances are: *Life of a Sailor* (1837); *Ben Brace* (1835); *The Arethusa* (1836); and *Jack Adams* (1838). All of his novels have been translated into German. He also wrote a *Review of the French Revolution of 1848* (1849), in which he gives a prejudiced view of some of the prominent actors.

CHAMINADE, shȧ′mē′nȧd′, CÉCILE LOUISE STÉPHANIE (1861—). A French composer, born in Paris. Although descended from a family of sailors, and thus lacking any hereditary artistic temperament, she early showed her musical precocity, composing, when only eight years old, sacred music, which was praised by Bizet. She studied under Le Couppey, Savard, Marsick, and Godard, and made her début as a pianist when eighteen, appearing with success in various European cities. Not only is Chaminade a brilliant pianist, but she is also well known as a conductor. Her fame, however, rests upon her compositions, which are among the most noteworthy of modern music. They are characterized by a comprehensive technical knowledge, virility, and strikingly original melodies and rhythms. Some of her most novel effects are produced by a skillful use of tone chromatics. Among her best known instrumental pieces are: *La lisonjera* (The Flatterer); *Pas des amphores;* and *Pas des écharpes* (Scarf Dance); *Au matin* for two pianos; *Callirhoë*, a ballet symphony performed first in 1888 in Marseilles; and *Les amazones*, a lyric symphony. Of equal importance are her songs, many of which have been introduced by Nordica and Plançon. They include "Le Ritournelle," "Madrigal," "Rosamunde," "The Silver Ring," "Berceuse," etc.

CHAMISSO, shȧ-mēs′sō, ADELBERT VON (1781-1838). An eminent German poet and naturalist. Although born in Champagne, France, he in childhood shared the exile of his parents, fleeing from the terrors of the French Revolution. In 1796 he became a page at the Berlin Court, and though his parents afterwards returned to France, education had made Germany more congenial to his poetic nature, and he identified himself wholly with his adopted country. In 1798 he entered the army as ensign, and in 1801 became lieutenant. He showed his interest in the military calling by two technical treatises published in 1798 and 1799. Already he had joined a romantic brotherhood, which included several young men destined to fame, Varnhagen, Hitzig, and Alexander zur Lippe. He studied Homer diligently, translated much into German, and in 1803 essayed a *Faust*, the only one of his early poems preserved in his *Works*. He also coöperated as editor of the *Musenalmanach* (1804-07). In 1806 he resigned from the army and spent several years in futile and discontented bohemian wanderings. He was in France in 1806 and again in 1810, when he undertook to turn into French Schlegel's noted *Lectures on Art and Literature*, staying with him and Madame de Staël at Chaumont, and later at Coppet, till his manners made him impossible. Here he was led to study botany, and in 1812 he matriculated as a student of medicine in Berlin. In the next year, during the War of Liberation, he retired to Kunersdorf, and while there wrote his most noteworthy prose work, *Peter Schlemihl*, a wonderful tale of the loss of a shadow by compact with the devil, an idea familiar to folklore and already developed by Goethe in his *Märchen*, and by Körner in his *Teufel von Salamanca*, but here given its enduring and classic form. He took part in Captain Kotzebue's Russian Polar expedition (1815-18), and in 1835 published in a *Journal* an account of it which in style and power of description is among the classics of travel. He returned to Berlin in 1819, and was appointed assistant custodian of the botanical garden. While here he married Antoine Piaste. Having recovered an indemnity of 100,000 francs for his French estates, he visited Paris in 1825. His greatest literary activity dates from his return, when he settled down to domestic life and peaceful production stimulated by the genial companionship of his wife, to whose inspiration we owe especially the charming poetic cycles *Frauenliebe und -Leben*, and *Lebens-Lieder und -Bilder*. He also made an admirable translation of the *Song of Thrym*, from the *Edda*, and many versions from other languages. From 1832 till his death he was editor of the *German Musenalmanach*, which he made an annual of much literary importance. His poetry is small in amount, but widely popular in Germany. Some of his ballads and romances rank among the finest in German literature. His international reputation rests on the many translations of *Peter Schlemihl*. His collected *Works* fill six volumes (Leipzig, 1836-39; 6th ed., Berlin, 1874), containing also his *Biography* by Hitzig, and his *Letters*. Consult, also: Fulda, *Chamisso und seine Zeit* (Leipzig, 1881); and Du Bois-

Reymond, *Chamisso als Naturforscher* (Leipzig, 1889).

CHAMOIS, shăm'mĭ, *Fr. pron.* shä-mwä' (Fr., It. *camozza*; probably from MHG. *gemeze*, *gemz*, Ger. *Gemse*, chamois; cf. also Sp., Port. *gamo*, fallow deer), or GEMSE. A goat-antelope (*Rupicapra tragus*), inhabiting the high mountains of southern Europe. It occurs in the Pyrenees, where it is called 'izard;' in the mountains of the coasts of Spain, Dalmatia, and Greece; in the Alps, Carpathian, Caucasus, and Taurus ranges, and in Georgia. The izard of Spain and the atchi of the Caucasus and beyond differ somewhat from the typical chamois of Tyrol, but only as local races. The chamois is about the size of a large goat, but the neck is longer in proportion, and the body shorter. The color is brown, deeper in winter than in summer; the tail is black; the head a pale yellow, with a dark-brown band along each cheek. The horns, seldom more than 6 or 7 inches long, rising nearly straight up from the forehead, are black and so bent back at the tip as to form a hook. (See Plate of GOAT-ANTELOPES.) The usual summer resort of the chamois is in the higher regions of the mountains which it inhabits, not far from the snow-line, and it is often to be seen lying on the snow. In winter it descends to the higher forests, where, indeed, the females and their young fawns spend most of the time. The aromatic and bitter plants of the mountain pastures are its favorite food. Flocks of 100 are sometimes seen; but in the Swiss Alps, where the numbers have been much reduced by hunting, the flocks are generally very small, and often consist only of a few individuals. Old males often live solitarily. The chamois produces one or two young at a birth, in May or June.

It is an animal of extraordinary agility, and flocks may often be observed sporting in a remarkable manner among the rocky heights. It can leap over ravines 16 to 18 feet wide; a wall of 14 feet high presents no obstacle to it; and it passes readily up or down precipices which almost no other quadruped could attempt. It is said to descend obliquely almost perpendicular precipices of more than 20 feet, striking its feet once or twice against the rock, as if to stay and guide its descent, and alighting securely, often on a very narrow ridge of rock, with its hind feet first, and bringing the fore feet almost into contact with them. When a flock of chamois are feeding (usually early in the morning) one is always on the watch, and by a sort of whistle announces apprehended danger.

The hunting of the chamois is attended with great hardship and much danger, but calls forth the highest qualities of both sportsmanship and mountaineering, since no great numbers exist, nor is any free hunting to be had except in the remotest and loftiest Carpathians, or else in Persia. This is due to the fact that for many years the Alpine resorts, and much of the region to the eastward, have been most strictly preserved by royal decree or private ownership, and only a very limited number of animals permitted to be killed annually; yet much poaching is done. The finest and proper way is to stalk the quarry alone, or with only a guide, but battue methods are frequently followed in Bavaria and Transylvania. The flesh of the chamois is highly esteemed. Its skin is made into leather, and from it the original 'shammoy,' or 'shammy leather,' so much prized for softness and warmth, was obtained. (See LEATHER.) Its horns and hoofs are mounted as ornaments, alpenstock-handles, etc., and form a valuable article of trade at mountain resorts. When taken young the chamois is easily tamed.

CHAMOMILE, kăm'ō-mīl, or **CAMOMILE** (OF. *camamille*, Med. Lat. *camamilla*, Lat. *chamomilla*, from Gk. *χαμαί*, *chamai*, on the ground + *μῆλον*, *mēlon*, apple). A genus of plants of the natural color Compositæ, suborder Tubulifloræ, distinguished by imbricated bracts, a scaly conical receptacle, a ray of one row of female florets, those of the disk hermaphrodite, the achænia obscurely four-cornered, and destitute of pappus. The species are annual and perennial herbaceous plants, chiefly natives of Europe and other temperate parts of the world. The common chamomile (*Anthemis nobilis*), the Roman or true chamomile, the most important species of the genus, well known for its medicinal virtues, is a perennial plant with a stem about a foot long, procumbent and much branched, each branch terminated by a flower (head of flowers) more than an inch broad, with yellow disk and white ray, the whole plant intensely bitter and highly aromatic. It contains a bitter principle, tannin, and a volatile oil, *oil of chamomile*, which abounds most of all in the involucre. The dried flowers constitute the part used in medicine; the infusion made from them is used to a slight extent as a stomachic tonic, especially in convalescence. The German chamomile, or Matricaria, consists of the flowers of *Matricaria chamomilla*. This is called wild chamomile in Great Britain. Its flowers are smaller and the taste and odor stronger and less pleasant. No small quantity of common chamomile is illegally used in the manufacture of beer in England, and it is imported from Germany for this purpose. Yet this plant is so abundant in some parts of the south of England as to form a principal part of the pasture in sheep-walks, and to fill the whole air with its scent. The other British species of chamomile are mere weeds; one of them, called stinking chamomile (*Anthemis cotula*), is so acrid as to blister the fingers if much handled. But the flowers of the ox-eye chamomile, or dyer's chamomile (*Anthemis tinctoria*), a native of many parts of the Continent of Europe, yield a beautiful yellow dye, on account of which the plant is often cultivated.

CHAMONIX, shä'mō'nē', or **CHAMOUNI**, shä'mo͞o'nē' (Lat. *Campus munitus*). The name of a wild and romantic valley and village among the Alps in the Department of Haute-Savoie, France (Map: France, N 6). It lies at an elevation of about 3400 feet above the level of the sea, is about 13 miles long and 1 mile broad, and is traversed by the Arve. It begins at the northeast, from the Col-de-Balme, over which there is a mule-path to Martigny, in the upper valley of the Rhone. From the other end issues the road to Geneva, which is 53½ miles from Chamonix. On the north side lie Mont le Brévent and the chain of the Aiguilles Rouges, and on the south is the giant group of Mont Blanc, with its enormous glaciers. The chief of these glaciers are the Glacier des Bossons, des Bois, d'Argentière, and du Tour. By ascending to a point called Montanvert, we come upon the upper course of a glacier, where it expands into a great mountain-lake of ice called the Mer de Glace, in which there is a solitary rock or oasis called Le Jardin, about 7 acres in extent, and covered with the most beautiful herbage. Until 1741 the valley was almost unknown; the region was considered a wilderness, and known by the name of Les Montagnes Maudites, or 'accursed mountains.' In that year it was visited by two Englishmen, Pococke and Wyndham, who ascended as far as Montanvert. It was only, however, in 1775, that the attention of travelers was effectually called to it by Saussure and Bourrit. The valley is rich in peculiar plants, and furnishes an aromatic and perfectly white honey. The village of Chamonix owes its origin to the Benedictine convent founded between 1088 and 1099. The inhabitants depend for a livelihood partly upon the tourists who visit the valley, and partly upon the pastures and upon hunting. There are several good hotels, and the best guides are to be found here for the neighboring Alps. It is from Chamonix that Mont Blanc is usually ascended. Consult Whymper, *Chamonix and the Range of Mont Blanc* (London, 1896).

CHAMONT, shä'môɴ'. The brother of the hero in Otway's *The Orphan*. He is a typical adventurer, mercenary, and fighter of Restoration tragedy.

CHAMOUCHOUAN, or ASHUAPMOUCHOUAN. A northwestern affluent of Lake Saint John (q.v.), Quebec, Canada, and the outlet of Chamouchouan, Obatogaman, Shabogama, and other lakes of the district.

CHAMPAGNE, shäɴ'pä'ny' (Fr., flat country, It. *campagna*, Lat. *campania*, plain, from *campus*, field). A former province of France, now included within the Departments of Marne, Haute-Marne, Seine-et-Marne, Aube, Ardennes, Aisne, and Yonne. The province was about 180 miles long by 150 broad, its surface presenting extensive plains with ranges of hills, especially in the north and east, from the vineyards of which is produced the famous champagne wine. In ancient times Champagne was subjugated by Cæsar, and afterwards was annexed to the kingdom established by the Franks. After the Tenth Century it had its own counts, who were vassals of the French kings. The capital was Troyes. By the marriage of Philip IV. with Joanna, heiress to the Kingdom of Navarre, in 1284, Champagne and Brie came to the French Crown, and were incorporated in 1361.

CHAMPAGNE, shäɴ'pä'ny', or **CHAMPAIGNE**, PHILIPPE DE (1602-74). A Flemish painter. He was born in Brussels, studied under Fouquières, at Antwerp, and removed to Paris in 1621. He was soon employed with Nicholas Poussin in painting the decorations of the Luxembourg Palace for Maria de' Medici. Later he was much employed by Richelieu, whose portrait he painted many times. His masterpiece is "The Last Supper" (in the Louvre), which he painted for the Port Royalists, with whom he was closely associated in his latter years. He was member and later rector of the Académie de Peinture et de Sculpture, founded in 1648.

CHAMPAGNE (shăm-pān') **WINE**. See WINE.

CHAMPAGNY, shäɴ'pä'nyā', FRANÇOIS JOSEPH NOMPÈRE (1804-82). A French publicist, born in Vienna. He became a member of the Neo-Catholic party, and with Montalembert contended for Catholic schools of instruction independent of the University of France. The *Correspondant* and *Ami de la religion* of Paris counted him on their staffs. In 1869 he was elected to the French Academy. His publications include *Du projet de loi sur la liberté d'enseignement* (1847) and *Histoire des Césars* (4 vols, 1841-43).

CHAMPAGNY, shäɴ'pä'nyā', JEAN BAPTISTE NOMPÈRE DE, Duc de Cadore (1756-1834). A French courtier and diplomat, born at Roanne. In 1789 he was elected to the States-General, and as a supporter of the Third Estate became a prominent member of the General Assembly. During the Reign of Terror he was imprisoned (1793), but was released after Robespierre's fall, and was made a councilor of State by Napoleon. His adaptability and his skill in negotiation won him Napoleon's favor, and he became Ambassador to Vienna (1801-04), Minister of the Interior (1804-07), and Minister of Foreign Affairs (1807-11). In 1809 he accompanied the Emperor to Austria, where he negotiated the Treaty of Vienna. After the restoration of the Bourbons (1811), he retired from public life, but in 1819 was restored to the Chamber of Peers.

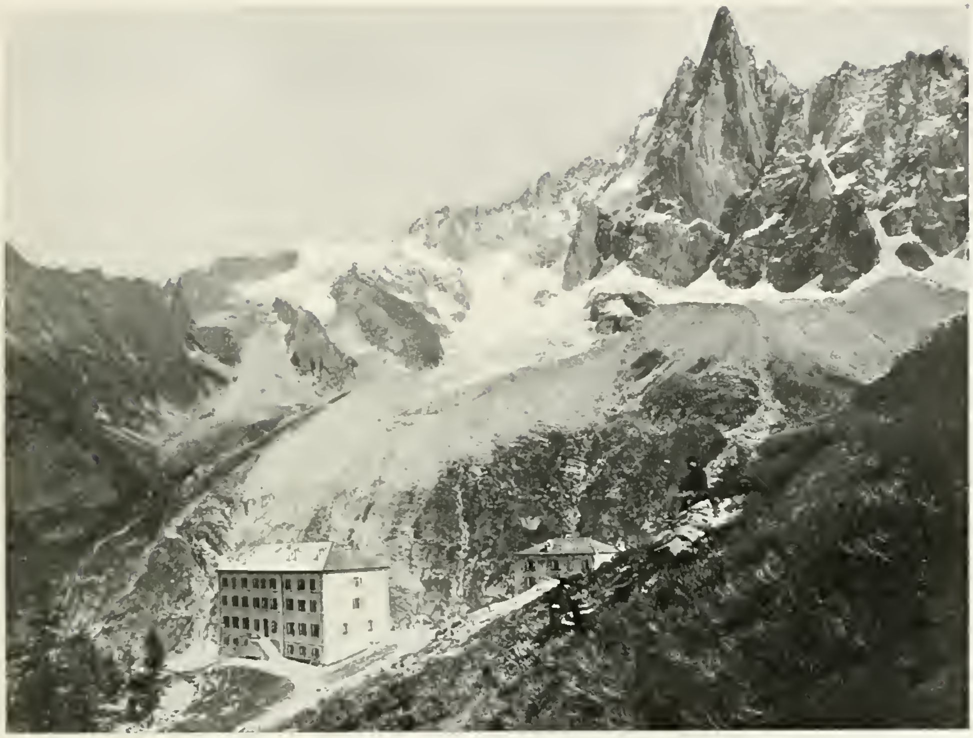
CHAMPAIGN, shăm-pān'. A city in Champaign County, Ill., 128 miles south by west of Chicago, on the Illinois Central, the Cleveland, Cincinnati, Chicago and Saint Louis, and a branch of the Wabash railroads (Map: Illinois, D 3). It is located in an agricultural region, and has an ice and cold storage plant, railroad shops of the Illinois Central, and extensive foundries. It is the twin town of Urbana, and has a fine public library with about 8000 volumes. There are several parks in the city. Settled in 1855, Champaign was incorporated five years later. Its government is administered by a mayor, elected every two years, and a city council. Population, in 1890, 5839; in 1900, 9098.

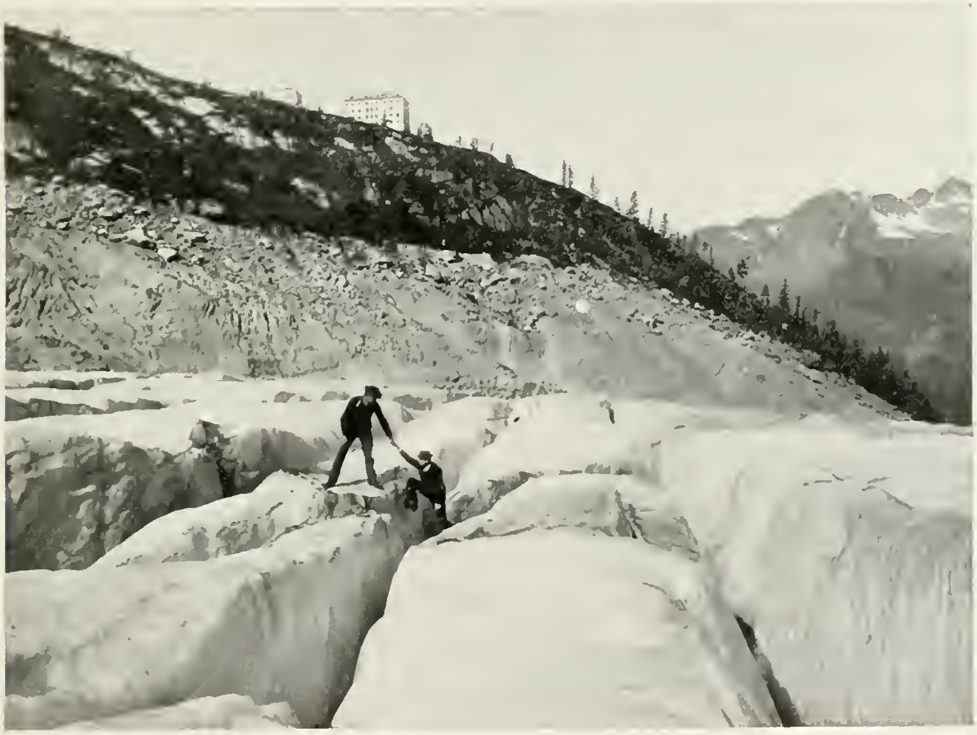
CHAMP DE MAI, shäɴ de mā. See CHAMP DE MARS.

CHAMP DE MARS, märs (Fr., Field of Mars, Lat. *Campus Martius*). The name given to the annual meetings held in the month of March by the Franks of Gaul in the Fifth Century, and later. These were either national assemblies called for the purpose of deliberation upon important matters, and for the trial of important cases, or else military reviews. The Champs de Mars were not held as frequently under the later Merovingians, but were revived by Pepin, who held his meetings, however, in May (hence the name CHAMP DE MAI) and made the body legislative in character. At a subsequent period the meeting was revived as the council for the King.

CHAMP DE MARS (Fr., Field of Mars). A great parallelogram in Paris, between the Seine and the Ecole Militaire, used especially for military purposes and drills. It is 1093 yards long and 537 wide, with four rows of trees on each side, flanked by ditches, and entered by five gates. It has been the scene of many remarkable political and public celebrations, from the Feasts of the Federation and of the Supreme Being during the French Revolution, to the universal expositions of 1867, 1878, and 1889.

CHAMPEAUX, shäɴ'pō', GUILLAUME DE. See GUILLAUME DE CHAMPEAUX.





CHAMONIX

HOTEL AND AIGUILLE DU DRU (UPPER)
MER DE GLACE AND HOTEL (LOWER)

CHAMPERICO, chäm'pȧ-rē'kō. A port of Guatemala; situated on the Pacific coast, at the mouth of the Salamo, 100 miles southwest of Guatemala. The town is connected with Acapulco, Mexico, by steamship, and with the interior by railroad, and is the residence of a United States consular agent. Its chief article of export is coffee. Population, 1000.

CHAMPERTY, shăm'pēr-tĭ, or **CHAMPARTY** (OF. *champart*, from Med. Lat. *campipars*, *campars*, *campartagium*, from Lat. *campi pars*, part of the field, from *campi partitio*, a division of lands). A bargain between the plaintiff or defendant in a suit, and a third party, generally a lawyer, that the latter shall have part of the land, debt, or other thing sued for, in the event of success, and that in the meantime he shall carry on the suit at his own expense. This practice has been strictly forbidden by statute in England from very early times (3 Edward I. c. 25; 13 Edward I. c. 49; etc.); and in Scotland the rule of the civil law by which the *pactum de quotâ litis* was held to be a *pactum illicitum*, and as such void, has all along been part of the common law. Such practices were also forbidden by statute to members of the college of justice (1594 c. 216). There is this difference between the laws of the two countries, however, that whereas in England the offense has always been punished criminally, in Scotland the only penalty which it entails, beyond nullity of the bargain, is deprivation of office. According to Blackstone, the word "signifies the purchasing of a suit, or a right of suing—a practice so much abhorred by our law that it is one main reason why a chose in action, or thing of which one hath the right but not the possession, is not assignable at common law, because no man should purchase any pretense to sue in another's right."

In many of the United States, however, champertous agreements are authorized by statute; and, both in England and in this country, the prevailing tendency is toward freedom of contract between litigant and lawyer, and between the owner of a *chose in action* (q.v.) and any one who is willing to buy it. See MAINTENANCE.

CHAMPFLEURY, shäɴ'flē'rē'. The pseudonym of Jules Fleury-Husson (1821-89). A French novelist and miscellaneous writer, born at Laon. His early work was an essential though an apparently accidental contribution to the naturalistic movement in French fiction, though most of his novels are romantic and even bohemian. In these he appears as a quiet and genial observer of the follies of mankind, not a satirist of its vices. In *Chien-Caillou* (1847), and especially in his best novel, *Les bourgeois de Molinchart* (1854), he forms a most interesting connecting link between Balzac in his *Scenes de la vie de province* and Flaubert in the epoch-making *Madame Bovary* (1856). Champfleury wrote also three volumes of *Etudes littéraires*, and a valuable *Bibliographie céramique*, as well as other works on the history of pottery based on the collections of the porcelain manufactory at Sèvres, of which, in 1872, he was made custodian.

CHAMPION (from Med. Lat. *campio*, combatant, from *campus*, [battle]-field). In the judicial combats of the Middle Ages, women, children, and aged persons were allowed to appear by deputy in the lists. Such a deputy was called a champion. Those who followed this profession were generally of the lowest class, and were regarded as disreputable, and in case of defeat were liable to equal punishment with their clients. They were obliged to wear a peculiar armor and dress of leather, and were not allowed to fight on horseback. Champions are mentioned as early as the time of Charlemagne. A noble was not required to meet a plebeian, nor were the clergy allowed to enter the lists. In the age of chivalry the champion was a knight, who entered the lists in behalf of an injured lady, or child, or any one incapable of self-defense. The term champion was also applied to the knight who saw that no injury or insult was offered to ladies at tournaments. In England, formerly, on coronation day a knight fully armed would challenge all who denied the King's right to the throne. The custom, which dates back to William the Conqueror, became, in the time of Richard III., the hereditary right of the Dymoke family, and was last observed at the coronation of George IV.

CHAMPION, THE. An anti-ministerial journal founded by Henry Fielding, while living in the Temple, in 1739. In 1741 he was assisted by James Ralph, who had edited the *Universal Spectator*, and who continued to bring out the new venture after Fielding had retired from it. The paper was modeled after Addison's *Spectator* and is noteworthy as containing a rather fierce attack by Fielding on Colley Cibber, who had referred to him slightingly in his *Apology*.

CHAMPION HILLS. A group of hills in Hinds County, Miss., 20 miles east of Vicksburg, where, May 16, 1863, during the Civil War, a Federal force of about 15,000 (actually engaged), under General Grant, defeated a somewhat larger Confederate force under General Pemberton, the battle lasting about four hours, and the losses in killed, wounded, captured, and missing being about 2450 for the Federals and 5500 for the Confederates (Map: Mississippi, D 6).

CHAMPLAIN, shăm-plān'. A lake lying between Vermont and New York (Map: New York, G 1). It is 110 miles long and increases in width from one-quarter of a mile in the south to 13 miles in the north. Its area is about 600 square miles, of which two-thirds is in Vermont. The northern extremity extends 6 miles into Canada. It is about 95 feet above the sea, has a maximum depth of some 300 feet, and is navigable for the largest vessels. It is drained at the north by the Richelieu River (q.v.), which empties into the Saint Lawrence. It is connected with the Hudson by a canal from Whitehall. Its principal islands are those composing Grand Isle County, Vt. Grand Isle, 12 miles long and 1 to 4 miles wide, contains two townships—Grand Isle and South Hero. North Hero, 14 miles long, 2 to 3 miles wide, and Isle La Motte, 6 miles long and 1 to 2 miles wide, are the other main islands of the group. Alburg Peninsula, about 12 miles long and projecting south from Canada into the lake, completes the territory of Grand Isle County. The general shore-line is sinuous and offers many fine bays and bold promontories. The scenery in this region is beautiful. The Green Mountain range (q.v.) lies about 20 miles east of the lake; on the west are the Adirondacks. The chief towns along the waterline are Rouse's Point, Plattsburg, Port Henry, Crown Point, and Whitehall in New York, and Burlington in Vermont. Lake Champlain receives the discharge of Lake George and of several small rivers. It was discovered by Samuel de Champlain in 1609, whence the name. Its amphitheatre was the scene of much activity during the French and Indian War, and also during the American Revolution.

THE BATTLE OF LAKE CHAMPLAIN. The name given to a decisive naval engagement of the War of 1812, fought off the town of Plattsburg, on September 11, 1814, between a British fleet under Captain George Downie and an American squadron under Commodore Thomas Macdonough. In July, 1814, a British army of about 11,000 men, under Sir George Prevost, undertook the invasion of New York, by the way of the western shore of Lake Champlain. To reinforce this movement it was necessary, however, to dispose of the small American fleet which was then at Plattsburg. In preparation for the coming naval battle, both sides increased their strength by the building of ships. On September 11 the British fleet entered Plattsburg Harbor, and assailed the American squadron, which was awaiting their attack at anchor. Macdonough had chosen an advantageous position, with his line of battle so disposed as to make it impossible for the enemy to turn either flank. The two fleets were about equally matched in fighting strength, the American squadron numbering 14 vessels of some 2250 tons, with 882 men and 86 guns; while the strength of the British comprised 16 vessels of 2400 tons, with 937 men and 92 guns. The advantage in training and seamanship was probably on the side of the British. The battle lasted about two and one-half hours, and ended in a victory for the Americans. Owing to the close range at which the ships engaged, the loss was heavy on both sides, the Americans losing about 200, as against more than 300 for the British. As a result of the battle, the plan of British invasion by land was abandoned, and Prevost retreated in haste to Canada. The victory was also effective in hurrying on the close of hostilities. Consult: Roosevelt, *The Naval War of 1812* (New York, 1882); Johnson, *History of the War of 1812-15* (New York, 1882).

CHAMPLAIN, SAMUEL DE (1567-1635). A French explorer and colonizer, the founder of Quebec, and the most prominent figure in the early history of New France. He was born at Brouage, in Saintonge, the son of a ship captain; received a careful training in the principles of navigation and cartography; entered the army, and served in Brittany as quartermaster of cavalry under D'Aumont, Saint Luc, and Brissac. In 1598 he accompanied his uncle, recently appointed pilot-general of Spain, when the latter carried home from Blavet the Spanish soldiers who had served in France as allies of the Leaguers, and in January, 1599, he was placed in command of the *Saint Julien*, which, with several other vessels, started at that time for the West Indies. After an absence of more than two years, during which he visited various Spanish settlements in America, including Mexico City and New Granada, Champlain returned to France and made a careful report of his observations to Henry IV. This report, entitled *Bref discours des choses plus remarquables que Samuel Champlain a reconnues aux Indes Occidentales*, remains in manuscript at Dieppe, and was not printed in the original until 1870, though an English translation was published by the Hakluyt Society in 1859. In it Champlain suggests the building of a canal across the Isthmus of Panama, "by which," he says, "the voyage to the South Sea would be shortened by more than 1500 leagues." In 1603 he accompanied the expedition sent out by Amyar de Chastes to choose a site for a proposed settlement, explored the Saint Lawrence to the La Chine Rapids and the Saguenay for 30 or 40 miles, and soon after his return published a small work entitled *Des sauvages: ou voyage de Samuel Champlain de Brouage fait en la France Nouvelle*, which, together with his other works, has been of the utmost value to historians, and gives an especially interesting account of the character and habits of the Indians. In the following year, Champlain came to America with De Monts (q.v.), who, on De Chastes's death (1603), had secured the privilege of colonizing Acadia, and during the next three years, in the course of four separate voyages, explored the Bay of Fundy and the New England coast from the mouth of the Saint Croix to Vineyard Sound, though he also spent much of his time during this period at the settlement which was established first at Saint Croix and afterwards at Port Royal, near the present Annapolis, Nova Scotia (q.v.). In 1607 he returned with the discouraged colonists to France, but in 1608 came again to America, this time as Lieutenant-Governor (an office which he held until his death), and on July 3 began to lay the foundations of Quebec (q.v.).

In 1609 he accompanied a band of Montagnais, Huron, and Algonquin Indians on an expedition against the Iroquois, discovered the lake which bears his name, and on July 30, near the present Ticonderoga, was instrumental in defeating a band of Mohawks—an event of great historical importance, since it definitely committed France to the policy, probably adopted by Champlain, whereby the French endeavored, by antagonizing the Five Nations, to secure the alliance of the diverse tribes of Canada, while the Iroquois were impelled to unite first with the Dutch and afterwards with the English. From 1609 until his death, Champlain spent part of almost every year in France, zealously looking after the interests of the colony, and while in Paris in 1610 he married Mademoiselle Hélène Boullé, then only 12 years of age, who, however, did not come to Canada until 1620. In 1610 he again took an active part in a battle with the Iroquois, who had formed a barricade of trees near the Sorel, and in 1611 he established a temporary trading-post on the site of the present Montreal. On the reorganization of the Government of New France in 1612, he was reappointed Lieutenant-Governor under de Soissons, and subsequently held this position under the Prince de Condé, the Duc de Montmorency, the Duc de Ventadour, and Cardinal Richelieu. In 1613, lured by the tales of one Vignau, who claimed to have found a great lake at the sources of the Ottawa and a salt sea not far distant, Champlain proceeded up the Ottawa as far as Allumette Island. Two years later he accompanied a band of Indians, known as 'The Great War Party,' on an expedition against the Iroquois, and after a circuitous journey by way of the Ottawa, Lake Nipissing, Georgian Bay, Trent River, and Lake Erie, unsuccessfully attacked the great Seneca fortress, located probably near the eastern end of Oneida Lake in New York. This was the last of his expeditions either for war or for exploration, and he passed the rest of his life for the most part in Quebec and in Paris. In 1619 he published a third volume, *Voyages et découvertes faites en la Nouvelle France, depuis l'année 1615 jusques à la fin de l'année 1618*; and in 1632 he issued his last work, *Les voyages de la Nouvelle France occidentale, dicte Canada, faites par le Sieur de Champlain Xainctongeois . . . et toutes les découvertes qu'il a faites en ce pais depuis l'an 1603 jusques en l'an 1629*, which is in part an abridgment of his three previous works relating to Canada. In July, 1629, he was forced to surrender Quebec to an English fleet under David Kirke, and, after being detained for some time as a prisoner in England, he went to France, whence, in 1633, he again came to Quebec (New France having been restored by England in the previous year), and there on Christmas Day, 1635, he died.

Bold and intrepid, far-seeing and resourceful, tactful in his dealings with his white subordinates and his red allies, born to command, and thoroughly imbued with the spirit of adventure and discovery, he was the real founder of French power in America, and richly earned his title, 'The Father of New France.' "Of the pioneers of the North American forests," says Parkman, "his name stands foremost on the list. It was he who struck the deepest and boldest strokes into the heart of their pristine barbarism. . . . His character belonged partly to the past, partly to the present. The *preux chevalier*, the crusader, the romance-loving explorer, the curious knowledge-seeking traveler, the practical navigator, all found their share in him. . . . His books mark the man—all for his theme and purpose, nothing for himself. Crude in style, full of the superficial errors of carelessness and haste, rarely diffuse, often brief to a fault, they bear on every page the palpable impress of truth." In 1870 a complete edition of Champlain's works was issued under the editorship of Laverdière and Casgrain, as *Œuvres de Champlain, publiées sous le patronage de l'Université Laval* (6 vols., Quebec, 1870), and an English translation of the *Voyages* was published by the Prince Society, under the title, *Voyages of Samuel de Champlain, Translated from the French by Charles P. Otis, with Historical Illustrations and Memoir by Rev. E. F. Slafter* (3 vols., Boston, 1878-82). For sketches of Champlain, consult: Parkman, *Pioneers of France in the New World* (Boston, 1865); Winsor, *Narrative and Critical History of America*, Vol. IV. (8 vols., Boston, 1886-89); Winsor, *Cartier to Frontenac* (Boston, 1894); and an excellent, though brief, biography by Sedgwick in the "Riverside Biographical Series" (Boston, 1902).

CHAMP LEVÉ, shäN' le-vā'. See ENAMEL.

CHAMPLIN, chămp'lĭn, JAMES TIFT (1811-82). An American educator. He was born in Colchester, Conn., graduated at Brown University in 1834, and entered the Baptist ministry. He was professor of ancient languages in Waterville College (now Colby University) from 1841 to 1857, and was president from 1857 to 1872. He published a number of college text-books, including a *Text-Book of Intellectual Philosophy* (1860); *First Principles of Ethics* (1861); and a *Text-Book of Political Economy* (1868).

CHAMPLIN, JOHN DENISON (1834—). An American writer. He was born in Stonington, Conn., graduated at Yale in 1856, studied law in Litchfield, Conn., and was admitted to the bar in 1859. In 1862 he began newspaper work, and from 1865 to 1869 was editor of the Litchfield *Sentinel*. He edited *Fox's Mission to Russia* (1873), was one of the corps of editors of Appleton's *American Cyclopædia* (1873-77), and was one of the editors of the *Standard Dictionary* (1892-94). He also edited *Young Folks' Cyclopædia of Common Things* (1879); *Young Folks' Cyclopædia of Persons and Places* (1880); *Young Folks' Cyclopædia of Literature and Art* (1901); and with Arthur E. Bostwick, *Young Folks' Cyclopædia of Games and Sports* (New York, 1890), and was joint editor with C. C. Perkins of a *Cyclopædia of Painters and Paintings* (4 vols., New York, 1881-87), and with W. F. Apthorp, of a *Cyclopædia of Music and Musicians* (3 vols., New York, 1881-91).

CHAMPMESLÉ, shäN'mā'lā', MARIE DESMARES (1641-98). A celebrated French actress, born in Rouen, and married in 1667 to Charles Chevillet de Champmeslé, who was an important comedian and playwright of his day. She had already begun her career in the provinces when she came with her husband in 1669 to the Théâtre du Marais in Paris. Her great reputation seems to have started with her acting of Hermione in *Andromaque* at the Hôtel de Bourgogne the following year. Racine was notoriously captivated by her charms, and the public appreciation of her acting was almost as enthusiastic. She and her husband went over in a few years to the Théâtre Grénégaud, and in 1680 at the union of the companies they became members of the new Comédie Française. During her brilliant career 'La Champmeslé' created a large number of the famous rôles, among them Bérénice, Ariane, Phèdre, Vénus in *Les amours de Vénus et d'Adonis*, Atalide in *Bajazet*, Monime in *Mithridate*, Iphigénie in *Iphigénie en Aulide*, and the same character in *Oreste et Pylade*. She left the stage, in the vain attempt to restore her health at Auteuil, where she died.

CHAMPNEY, chămp'nĭ, BENJAMIN (1817—). An American painter, born at New Ipswich, N. H. He studied in Boston and Paris, and several times exhibited at the Salon. His best works are paintings of White Mountain scenery. He has written *Sixty Years' Memories of Art and Artists*.

CHAMPNEY, JAMES WELLS (1843-1903). An American artist, born in Boston. He first studied wood-engraving, then was a pupil of the Antwerp Academy, and afterwards of Edouard Frère at Ecouen, France. His works include genre subjects and many excellent portraits in pastel. His wife, ELIZABETH WILLIAMS CHAMPNEY (1850—), is the author of the "Witch Winnie Books," the series of "Vassar Girls Abroad," and *Romance of the Feudal Châteaux* (1900).

CHAMPNEYS, chămp'nĭz, BASIL (1842—). An English architect and author. He graduated at Trinity College and studied architecture as a pupil of John Pritchard of London. He built the divinity and literary schools at Newnham, the Archæological Museum at Cambridge, Indian Institute (New College), Mansfield College (Oxford). Butler Museum (Harrow), the Quincentenary Buildings (Westminster College), and many churches and schools. His publications include *Coventry Patmore, Memoirs and Correspondence* (1900).

CHAMPOLLION, shäɴ'pô'lyôɴ', Jean François (1790-1832). A French Egyptologist. He was born December 23, 1790, at Figeac, Department of Lot. He is often called Champollion le Jeune, in distinction from his brother Champollion Figeac, a professor at Grenoble, who educated him. In 1807 he went to Paris to pursue his various Oriental studies, and in 1816 was appointed professor of history at the lyceum of Grenoble. In 1814 he published *L'Egypte sous les Pharaons*, a study of the geography of ancient Egypt. Afterwards he essayed the decipherment of the Egyptian hieroglyphics to which the discovery of the Rosetta stone had attracted widespread interest. His brilliant results were first communicated in his *Lettre à Monsieur Dacier* to the public (1822), and were more fully stated in his *Précis du système hiéroglyphique* (1824). It is now generally recognized that the attempts to ascribe priority in the decipherment of hieroglyphics to Dr. Thomas Young, and even to charge Champollion with plagiarizing Young's discoveries, were entirely unjust. Champollion worked independently, and in any case Young's results published in 1819 were of slight importance as compared with those obtained by Champollion. Champollion was sent by the French Government to study the museums of Italy in 1824, and in 1828 to Egypt, where he joined a Tuscan expedition, headed by Rosellini. After his return he became a member of the French Académie des Inscriptions (1830), and in 1832, professor of Egyptology at the Collège de France. His premature death was doubtless due to constant overwork. His genius and his untiring industry are most clearly shown in his posthumous works. His *Grammaire égyptienne* (1836) and his *Dictionnaire hiéroglyphique* (1841) were both unfinished at his death. His *Notices manuscrites* (1844, et seq.), at first in incomplete form, gives a more adequate idea of the results of his Egyptian journey than the more extensive *Monuments de l'Egypte*, published 1835 et seq. Of the numerous books and essays published during his lifetime, the most noteworthy are *Panthéon égyptien* (1824); *Sur l'écriture hiératique* (1821); *Sur l'écriture démotique* (1824). After Champollion's death, Egyptology retrograded temporarily, and much time was wasted in fruitless disputes on the merits of Champollion's system. At present, no one doubts the enormous debt of gratitude owed by science to the great decipherer, whose system has been brilliantly confirmed by modern discoveries, although it has been greatly developed and improved in matters of detail. Consult Aimé Champollion, *Les deux Champollion, leur vie et leurs œuvres* (Grenoble, 1888).

CHAMPOLLION, Jean Jacques (1778-1867), usually called Champollion Figeac. A distinguished French archæologist, elder brother of J. F. Champollion (q.v.), the founder of Egyptology. He was born at Figeac, in the Department of Lot, October 5, 1778. After completing his collegiate studies, he was for a time librarian and afterwards professor of Greek at Grenoble. In 1828 he was appointed keeper of manuscripts in the Royal Library in Paris, and twenty years later became librarian at Fontainebleau. He was at the same time professor in the Ecole des Chartes. He died May 9, 1867, in his eighty-ninth year. Champollion first published a number of works on French history and philology. Among them were: *Antiquités de Grenoble* (1807); *Recherches sur les patois ou idiomes de France* (1809); *Nouveaux éclaircissements sur la ville de Cularo, aujourd'hui Grenoble* (1814). Then, at his brother's suggestion, he turned his attention to Egyptian archæology, limiting his studies, however, to the Greek documents bearing upon the subject. His *Annales des Lagides* (1819, with *Supplément*, 1821) was crowned by the Institute, and he published later, utilizing his brother's manuscript collections, *L'Egypte ancienne et moderne* (1840), and *L'écriture démotique égyptienne* (1843). Among his other works are: *Traité élémentaire d'archéologie* (2d ed. 1843); *Histoire des peuples anciens et modernes. l'Asie centrale, l'Inde et la Chine* (1857); *Monographie du palais de Fontainebleau* (1859-64); *Documents paléographiques relatifs à l'histoire des beaux-arts et des belles-lettres pendant le moyen âge* (1868). Champollion also collaborated actively in editing the MSS. left by his brother. Consult Aimé Champollion, *Les deux Champollion, leur vie et leurs œuvres* (Grenoble, 1888).

CHAMPS ELYSÉES, shäɴ'zâ'lê'zā'. The fashionable promenade of Paris—a magnificent avenue, extending from the Place de la Concorde to the Arc de l'Etoile, about one and one-third miles. It was laid out in 1616 by Marie de' Medicis, and is lined with fine trees and handsome edifices, among them the Palais de l'Elysée and the two Palais des Beaux Arts, occupying the site of the old Palais de L'Industrie. The afternoon concourse of carriages is one of the sights of Paris. The lower end of the avenue abounds in cafés chantants and restaurants.

CHANAK KALESSI, chȧ-näk' kä'lĕs-sē', or Kale Sultanie (Turkish, Pot Castle). A strongly fortified town of Asiatic Turkey, situated on the Dardanelles (Map: Turkey in Asia, B 2). It is of considerable strategical importance, and is the seat of high military officials. It has a well-developed pottery industry and a population of about 10,000.

CHANAR, chȧ-när', or **ESPINAL**, ā'spē-näl'. Names applied to the very thorny xerophytic (dry region) thickets of Argentina. See Thicket.

CHANCE (OF. *cheance*, from Med. Lat. *cadentia*, fall, from Lat. *cadere*, to fall). A word which in its original and strict meaning may be defined as the causelessness of an event. (See Causality.) But with the growing insight into the universal prevalence of causality, chance in this sense of the term is in most scientific and philosophical circles no longer regarded as possible. The word continues to be used in a different sense, viz. the unknown cause of an event. The cause may be entirely unknown, or unknown only in detail. In either case there is a lack of predictability, and in so far as an event is unpredictable it is said to be due to chance. The only case where chance is still believed in as the absence of causality is the case of volition. (See Determinism and Free Will.) The unpredictable event is itself called an accident, sometimes also itself a chance. See Probability.

CHANCEL (OF., from Med. Lat. *cancellus*, screen, Lat. *cancelli*, grating, dim. of *cancer*, lattice). The end of the church opposite the entrance. Usually in fact, and always in ritual, the east end, the choir end, was called the chancel because it was divided from the body of the church by a screen or rail which marked the beginning of the part reserved for the clergy. In Roman Catholic churches the screen was usually not high except in monastic churches, and in Gothic cathedrals, but in Greek and Russian churches it completely shuts off the spectator, as it did also in many mediæval English churches. The division was made sometimes so as to include the place for singers in the nave, sometimes it divided off only the altar and what was behind it to the end of the apse. In fact, it was used in England as practically synonymous with choir. A chancel aisle is the aisle or deambulatory of the choir. See Apse; Basilica; Choir; Church; Reredos.

CHANCELADE, shäN's'-läd'. A prehistoric station in Dordogne, France, belonging to the Magdalenian Paleolithic epoch. At the foot of an escarpment, beneath seven feet of débris, a human skeleton was found on the bed rock. For the literature, consult Mortillet, *Le préhistorique* (Paris, 1900).

CHANCELLOR (OF. *chanceler*, Fr. *chancelier*, Lat. *cancellarius*, porter, doorkeeper, from *cancelli*, lattice). Under the later Roman emperors the chancellor was an usher or officer whose duty it was to stand at the railing or latticework (*cancelli*) to protect the judicial officer from the crowding of the people and to act as intermediary between him and those having business with the court. Upon the breaking up of the Roman Empire the officer of the Crown in both the Eastern Empire and the Roman-German Empire and the kingdoms of the West, whose duty it was as notary or scribe to prepare and seal all important documents, was known as a chancellor. His position was one of great influence, and he became the chief officer of the Crown. The office was also adopted by the ecclesiastical court at Rome as an inheritance from the Roman Empire, and the office was in turn created in the several bishoprics, each diocese having its chancellor. In France the chancellor was an officer of State of great power and dignity. He was charged with the care of the great seal; he presided over the King's councils, and under him several other officers bearing the name of chancellor were employed in the administration of justice and the preservation of public order. During the Revolution the office was abolished (1790). It was revived by Napoleon I., though deprived of many of its functions. It was continued by the Bourbons, but finally, in 1848, merged with the Ministry of Justice. The chief functionary of the Austrian Empire and of other European States has often been termed chancellor, and on the establishment of the German Empire Bismarck, as the Prime Minister and chief administrative officer, was made Chancellor of the Empire (Reichskanzler.)

In England the chancellor, known as the Lord Chancellor or Lord High Chancellor, is the highest judicial officer of the Crown, the law adviser of the Ministry and the Keeper of the Great Seal. The existence of the office in England, as in the other States of Europe, is to be ascribed to the influence of the constitution of the Roman Empire, this influence being exercised in no small measure through the medium of the Church. In the early history of the office the Chancellor was always an ecclesiastic and the confidential adviser of the sovereign in State affairs. It is for this reason that he has been called the keeper of the King's conscience, and it is to this peculiar method of exercising his judicial functions upon equitable or conscientious, as distinguished from purely legal, principles that the Court of Chancery (q.v.), over which he presided, became of the highest importance in English jurisprudence. The Lord High Chancellor is the highest civil officer of the Crown, ranking next after the royal family and the Archbishop of Canterbury. The Chancellor is a privy councilor by his office, a member of the Cabinet, and prolocutor, or presiding officer in the House of Lords, by prescription. The writs for the convocation of Parliament are issued in his name. Though the form in which his tenure of office is terminated is by the resumption of the Great Seal by the sovereign, the Chancellor practically resigns office with the party to which he is attached. He has the appointment of all justices of the peace throughout the kingdom, but this privilege he exercises generally on the recommendation of the Lords Lieutenants. But the most important, and, as it now seems, somewhat anomalous branch of his patronage, arises out of his having been originally an ecclesiastic. Though the last bishop who held the office was John Williams, Archbishop of York, who was Lord Keeper from July 10, 1621, to November 1, 1625, the Chancellor still continues to be patron of all the Crown livings of the value of £20 per annum, or under (though in 1863 about 300 were sold to augment the incomes of those sold and those retained), and visitor of all hospitals and colleges of the King's foundation. As representing the paternal character of the sovereign, again, the Chancellor is the general guardian of all infants, idiots, and lunatics, and has the supervision of all charitable uses in the kingdom. As regards his judicial patronage, the arrangement is, that the Chancellor appoints in general all the judges of the superior courts, except the two Chief Justices, who are nominated by the Prime Minister of the day. Of inferior appointments, the latter also has reserved to him the commissioners of bankruptcy and the judges of the county courts. All these functions the Chancellor performs in addition to his extensive duties as the supreme judge of the Court of Chancery, both as an ordinary court of common law and of record, and as an extraordinary court of equity. Much inconvenience had arisen from the accumulation of duties in the single person of this high dignitary, and various expedients had been devised for lessening the evil. Vice-chancellors had been appointed, and the duties of the Master of the Rolls had been extended. In 1875 a considerable change was made by consolidating all the vice-chancellors' courts into one division, called the Chancery Division of the High Court. And the Chancellor's duties in the House of Lords as the highest appeal court were lightened by statute in 1876. The proposal of a Minister of Justice has, however, not yet found favor. The salary of the Chancellor is £10,000 a year, and he has an annuity of £5000 on his retirement from office. The style of the Chancellor, since the union with Scotland, has been Lord High Chancellor of Great

Britain; but he has scarcely any jurisdiction in Scotland, and in Ireland there is a separate Chancellor, having powers in most respects the same as those of the Chancellor of Great Britain. To slay the Chancellor is treason under 25 Edward III., c. 2.

The *Chancellor of the Exchequer* is the Minister of Finance under the British Government. He is a member of the Cabinet and of the House of Commons. Formerly he was a judge ex officio of the chancery division of the Court of Exchequer, but the equity jurisdiction of the Court of Exchequer was transferred to the Court of Chancery by statute 5 Vict. V., since which he has had no judicial functions. See CURIA REGIS; EXCHEQUER.

The *Chancellor of the Duchy of Lancaster* is an officer who formerly presided over the courts of law and equity in the Duchy of Lancaster. He is a member of the Cabinet. The office is now a sinecure.

In several of the United States the term chancellor has been applied to the chief judicial officer of the court of chancery when such court has been maintained as a distinct court from the courts of common law. In several of the States the judges of law courts have been given equity jurisdiction, thus doing away with the separate court of chancery. The title has not been used in New York since 1849, when the law courts of that State were given equity jurisdiction. The court and title still exist in Delaware, New Jersey, and some other States. The term is also employed in designating the foreman of the Scotch jury, the secretary of an embassy or consulate, the administrative officer of a college or university, or of an order. (See CHANCERY; EQUITY.) In Oxford and Cambridge the chancellor is generally some great nobleman, and has little or no connection with university administration, which is in the hands of the vice-chancellor, chosen from among the heads of the colleges. In the United States chancellor is used in a few instances for president, to designate the head of an educational institution.

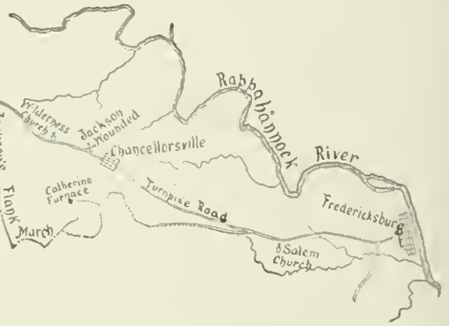
In the ecclesiastical use of the term, the *chancellor of a cathedral* is a dignified official, usually a canon, who superintends the arrangements for the celebration of the religious services. His office is quite distinct from that of the *chancellor of a diocese*, who is vicar-general to the bishop, and an ecclesiastical judge appointed to assist the bishop in questions of ecclesiastical law, and hold his courts for him. By 37 Henry VIII., Chap. 17, it is provided that the chancellor of a diocese may be a layman, whether married or single, provided he be doctor of the civil law lawfully create and made in some university. By the canons of 1603 he must be a bachelor of law at least, or a master of arts. There are certain cases, however, in which the bishop must sit in person. In case of complaint against a clerk in holy orders, for any ecclesiastical offense against the Church Discipline Act (3 and 4 Vict., Chap. 86), the bishop is to hear the cause, assisted by three assessors, of whom the dean of his cathedral, or one of his archdeacons, or his chancellor, must be one; and a sergeant-at-law, or advocate who has practiced five years in the court of the archbishop of the province, or barrister of seven years' standing, another.

CHANCELLOR, CHARLES WILLIAM (1833—). An American physician, born in Virginia. He was educated at the University of Virginia, and practiced medicine at Alexandria. During the Civil War he was medical director on the staff of General Pickett. In 1868 he was appointed professor of surgery in the Washington College of Maryland, and from 1893 to 1897 was United States consul at Havre, France. He is the author of a *Treatise on Mineral Waters*, a work on *Sewage Disposal*, and many essays on medical subjects.

CHANCELLOR OF THE EXCHEQUER. See EXCHEQUER.

CHANCELLOR, RICHARD (? -1556). An English navigator, who, in 1550, was the companion of Roger Bodenham on his voyage to Candia and Chios. In 1553 he was appointed pilot-general of the northern expedition under Sir Hugh Willoughby, the purpose of which was primarily to seek a northeast passage to China. During a hurricane off the Lofoden Islands the ships were scattered. The *Edouard Bonaventure*, under Chancellor, alone entered the White Sea, landing near the present site of Archangel. From here Chancellor proceeded to Moscow, where he was well received by the Czar, with whom he succeeded in negotiating a treaty of commerce, and shortly afterwards the Muscovy Company was established. Chancellor and his crew were shipwrecked and drowned while returning from a second voyage to Russia in 1556.

CHAN′CELLORSVILLE, BATTLE OF. One of the most important battles of the Civil War, fought May 2-4, 1863, at Chancellorsville, Va., 11 miles west of Fredericksburg, between the Federal Army of the Potomac, numbering about 130,000, under General Hooker, and the Confederate Army of Northern Virginia, numbering about 60,000, under General Lee. Hooker had superseded Burnside on January 26, and by the middle of April had succeeded in thoroughly reorganizing his army, restoring its *morale*, and preparing it for action. At this time the Federal and Confederate armies lay facing each other across the Rappahannock at Fredericksburg. Hooker resolved to turn the Confederate left flank, first sending nearly all his cavalry, under Stoneman, to destroy Lee's communications with Richmond. The main movement began on April 27, when Hooker sent a portion of the army, under Sedgwick, to distract Lee's attention by crossing below Fredericksburg, while the main force effected a crossing above the town. This movement was successfully executed, and during the night of April 30 the main force was concen-



CHANCELLORSVILLE.

trated at Chancellorsville, on Lee's left flank. Lee then turned to face Hooker, and on May 1 the latter timidly drew in his advance, and placed himself on the defensive. Early on May 2, Lee ordered Jackson, who had been stationed on his extreme right, with 30,000 men, to make a wide detour, and, swinging round to the extreme right of the Federal position, make an unexpected assault upon the enemy's flank. The direction of this movement was not apparent to the Federals, who began to regard it in the nature of a retreat. About 6 P.M., after a march of some 15 miles, Jackson fell suddenly upon the flank and rear of Howard's corps, which constituted the right flank of the Federal army, and, taking it by surprise, stampeded it. Jackson, while in advance of his troops, was fired upon and mortally wounded by his own men, who mistook his escort for a detachment of Federals. During the progress of this movement Lee sought to divert the attention of Hooker by a lively demonstration on his front. On the morning of May 3 Lee made a vigorous attack on front and flank, in which Jackson's force, now commanded by Stuart, played a leading part. The brunt of the assault fell upon General Sickles, on the Federal right, and General Slocum, at the centre. Hooker, who was stunned by the impact of a ball on a pillar against which he was leaning, showed indecision; Sickles, who had stayed Stuart's fierce onslaught, fell short of ammunition; some 30,000 fresh troops were not called into action; and at last the Federal line gave way, the army, however, falling back only a short distance to a strong defensive position. Lee was deterred from immediately following up his advantage by the news that his position was threatened on the right by the advance of the Federal force under Sedgwick. At night, on May 2, Hooker had sent word to Sedgwick to advance on Chancellorsville from Fredericksburg. On May 3 Sedgwick attempted to execute the order and captured Fredericksburg and the heights behind it. Lee sent reinforcements which checked his advance, and on the night of May 4-5 Sedgwick recrossed the Rappahannock. Lee then prepared to advance against Hooker on the 5th, but the latter hastily withdrew his army across the river during a heavy storm. In the four days, May 1-4, the Federals had lost about 17,300 in killed, wounded, and missing; the Confederates about 12,465. Lee had clearly outgeneraled Hooker at every point, and had won an important victory with greatly inferior forces; but his success was almost counterbalanced by his loss of Jackson. Emboldened by this victory and the apparent demoralization of the Federal army, he planned his invasion of Pennsylvania, which ended in the battle of Gettysburg (q.v.). Consult: Dodge, *The Campaign of Chancellorsville* (Boston, 1881); Doubleday, *Chancellorsville and Gettysburg* (2d ed., New York, 1882); Johnson and Buel (editors), *Battles and Leaders of the Civil War*, Vol. III. (4 vols., New York, 1887); *Official Records*, Vol. XXV. (Washington, 1889).

CHANCE-MEDLEY (Engl. *chance* + *medley*), and CHAUD-MEDLEY, or MELLÉ (OF. *chaude*, hot + *medlée*, fray). French expressions borrowed by the Scotch law. Though sometimes used interchangeably, they are, in reality, distinct in meaning, the one signifying a casual affray, the other an affray in the heat of blood or passion. Both are, in the United States and in most countries, recognized as pleas in mitigation of the offense of homicide (q.v.). See, also, DEFENSE; SANCTUARY.

CHANCERY (Fr. *chancellerie*, It., Med. Lat. *cancelleria*, from *cancellarius*, chancellor, from Lat. *cancelli*, lattice), COURT OF. In English law, the court presided over by the Lord High Chancellor, and until recently the highest court in England, inferior only to Parliament. Originally a chancery was the office of a secretary or chancellor (q.v.), where official documents were put in form, sealed, and dispatched, or filed as records.

The jurisdiction of the Court of Chancery was developed subsequently to the establishment of the English courts of law, and consisted of that portion of the King's judicial prerogative in civil causes which he had not delegated to the courts of law. Whenever, in the early history of the common law, a suitor conceived that he had suffered an injury or wrong for which the courts of law afforded no remedy by means of a common-law writ (q.v.), his only recourse was to petition the Crown. These petitions came to be addressed to the Chancellor, who, as the chief officer and adviser of the Crown and Keeper of the Great Seal, was deemed to be a personal representative of the King, and thus endowed with his judicial prerogative. The practice of obtaining relief in this manner gradually took on the character of a judicial proceeding, and the Chancellor's office, or chancery, came to be known as the court of the Chancellor or the Court of Chancery; or in modern times, as the Court of Equity (q.v.). To this peculiar origin of chancery jurisdiction is due several peculiarities in the manner in which jurisdiction is exercised which are fundamental in equity jurisprudence. Thus, as the Chancellor was the personal representative of the King, his authority was personal. It could be exercised at any time, whether in term time or vacation, and at any place in the kingdom. Unlike the judges of the courts of law, he could command an act to be or not to be done, as, by virtue of his office, his commands were the commands of the sovereign, he who refused obedience was guilty of contempt to the King, and his disobedience was punishable by imprisonment; and, as an ecclesiastic, the Chancellor could invoke the power of the Church and punish the contempt by excommunication. By reason of these powers of the Chancellor, the Court of Chancery became a court acting *in personam*, as distinguished from courts of law, which acted *in rem*.

The common-law procedure was founded on the theory that the parties to an action owed no obedience to the court. Thus, if the plaintiff brought an action at law to recover property wrongfully withheld from him by the defendant, or to recover damages for tort or breach of contract, the court could give judgment for the plaintiff, and then by its writ direct the sheriff to seize the property and deliver it to the plaintiff or levy upon the defendant's property and then satisfy the judgment; but if the defendant concealed the property of the plaintiff or his own, or removed it from the jurisdiction, the court of law was powerless to act. On the other hand, the court of equity, in a proper case, could direct the defendant to perform his contract or to turn over property to the plaintiff, or to do any act required by justice or the necessities of the case. It followed, from the difference in the character of the jurisdiction that was exercised by the two courts, that while the relief afforded by the court of law was necessarily remedial, the relief afforded in chancery might be, and frequently was, preventive. Thus the court of law had no power to restrain a defendant from doing an act which might injure the plaintiff in the future, but the Chancellor, by reason of his power to command, might issue an injunction directing the defendant to refrain from such an act.

Another important consequence of the difference in kind of jurisdiction exercised by the two courts was the ability of the Chancellor to deal with a many-sided controversy. A controversy at law was necessarily two-sided. The law court could only find a verdict and direct a judgment for either the plaintiff or defendant; but, inasmuch as the Chancellor might require obedience to his decrees on pain of punishment for contempt, it was possible for him, in a single proceeding, to determine and adjust the rights of numerous parties, not only as between plaintiff and defendant, but as between those who, nominally co-defendants, actually had some controversy among themselves. As recourse to the Chancellor was originally due to the inability of the litigant to obtain relief at law, it became a fundamental principle of the Court of Chancery that it would take jurisdiction of the cause only when it appeared that there was no adequate remedy at law. Moreover, as the Chancellor was originally an ecclesiastic and the 'keeper of the King's conscience,' he was said to exercise his jurisdiction on conscientious or equitable principles, for the purpose of doing justice, without regard to the strict rules of the common law. This gave rise to certain basic equitable principles unknown to the law, which, however, when once established by precedent, were applied by the court of equity in much the same manner that courts of law applied legal principles.

Upon these principles chancery, as do our modern courts of equity, afforded relief in cases of fraud (q.v.) and mistake (q.v.). It compelled defendants before it to give discovery (q.v.), administered trusts, etc., all matters of which courts of law took no cognizance. It also obtained an administrative jurisdiction over the affairs of married women, infants, and insane persons, by virtue of the Chancellor representing the King in his administrative capacity.

Thus there grew up with the common law a great legal system which, while consistent with and, indeed, supplementary to it, was largely independent of it. Its office was to mitigate the rigor of the rules of the common law and supply its deficiencies, and this it was able to do because of the manner in which it exercised its jurisdiction. The jurisdiction of the court of chancery is (a) coördinate, (b) supplementary, and (c) exclusive.

Jurisdiction is said to be coördinate when the litigant has his election to seek relief at law or in chancery. Hence, for breach of contract the plaintiff has the alternative of recovering damages at law; or, if legal damages are inadequate, securing specific performance of the contract by decree of the chancellor.

The jurisdiction of chancery is said to be supplemental when, for the purpose of protecting rights recognized and enforced by courts of law, it confers and enforces new equitable rights; thus the right of the mortgagor to redeem mortgaged property and of the mortgagee to foreclose in equity, and, in a similar manner, the exercise of its jurisdiction over waste (q.v.), are typical examples of the supplemental jurisdiction of chancery. (See MORTGAGE.) The jurisdiction of chancery is exclusive when its powers are exerted in protecting purely equitable rights—that is, rights which are recognized in chancery, but of which the law takes no cognizance. The most notable example is the jurisdiction exercised in chancery over uses and trusts (q.v.).

Before 1873 the constitution of the Court of Chancery in England consisted of the Lord High Chancellor, the Master of the Rolls, and three vice-chancellors. In that year an act was passed by which the Court of Chancery became one division of the High Court of Justice, retaining only its equity jurisdiction, its ordinary jurisdiction being transferred to other divisions of the court. This forms an important part of that 'fusion of law and equity' under the judicature acts (1873-76), which has so simplified and made orderly the practice of English courts.

In the United States the terms court of chancery and chancery are used in some States as equivalent to courts of equity and equity. The principles and practice of equity were generally transferred to this country as they existed in England; but in most of the States there are no separate courts of chancery, the same judge sitting, according to the nature of the case, either as a common-law or equity court. A few States, however, instituted courts of chancery under that name; these were Alabama, Delaware, Florida, Mississippi, New Jersey, Tennessee, and Vermont. As early as 1848 the State of New York not only abolished the distinction between courts of equity and common law, but did away with the old forms of practice in both.

Many of the States have followed this reform. By the United States Constitution Federal courts are especially given jurisdiction in equity as well as in common law, and the distinction between procedure at law and equity has been maintained, though both systems are administered by the same courts. (See EQUITY; EQUITY PLEADING; PRACTICE.) Consult: Kerly, *Historical Sketch of the Equitable Jurisdiction of the Court of Chancery* (Cambridge, Eng., 1890); Gilbert, *History and Practice of the High Court of Chancery* (London, 1758; first American edition, Washington, 1874); Marsh, *History of the Court of Chancery and of the Rise and Development of the Doctrines of Equity* (Toronto, 1890).

CHANCES, THE. A comedy by John Fletcher, first printed in the folio edition of 1647. It was altered by George Villiers, Duke of Buckingham, in 1682; but "the licentiousness of that nobleman's pen rendering the play improper for representation" at later and more refined periods, it was revised a second time by Garrick in 1773. Its source is Cervantes's novel *La Señora Cornelia*. A musical drama entitled *Don John, or the Two Violettas*, produced in 1821, was based on it.

CHANDA, chŭn'dȧ. The capital of a district of the same name, in the Nagpur Division, Central Provinces, British India (Map: India, C 4). The town stands on the left bank of the Virái, near its junction with the Wardha, 90 miles south of the town of Nagpur. Its walls, built of cut stone, and surrounded by a high parapet, are 6 miles round, from 15 to 20 feet high, and flanked with rough towers large enough for the heaviest guns. Its archæological remains, temples, regal tombs, and gigantic monolithic figures are interesting. It is well supplied with water. Chanda is the terminus of a branch connection of the Bombay Railway, and is noted for its great fair of three weeks' duration, held annually, in April. Population, 17,000. The district contains considerable iron and coal deposits. Area, 10,749 square miles. Population, in 1891, 697,600; in 1901, 589,400.

CHANDÂLA, chŭn-dä′lȧ (Skt. *caṇḍāla*). The lowest of the impure classes in Hindu caste. See Caste.

CHANDELEUR (shăn′de-lo͞or′) **ISLANDS.** A group of about fifteen small islands lying in the Gulf of Mexico from 20 to 30 miles off the east coast of Louisiana, from which mainland they are separated by Chandeleur Sound (Map: Louisiana, G 4). A lighthouse on the north end of the most northern island is in latitude 30° 2′ N. and longitude 88° 52′ W.; it has a fixed white light.

CHANDERNAGAR, chŭn′dẽr-nŭg′ẽr (Skt. *candranagara*, city of the moon, from *candra*, moon + *nagara*, city). A city in India with a territory of about 3½ square miles, belonging to France, situated on the west bank of the Hugli, 21 miles above Calcutta by rail, in latitude 22° 50′ N. and longitude 88° 23′ E. (Map: India, E 4). A former rival to Calcutta in commercial importance, its trade has declined owing to the silting of its river approaches. The population, about 26,000, includes a French sub-governor with a small military detachment, and a few Europeans and Eurasians, the great bulk being natives. The settlement dates from 1673. It was taken three times by the English, but was finally restored to France in 1816.

CHAND′LER, Charles Frederick (1836—). An American chemist, born at Lancaster, Mass. He was educated at the Lawrence Scientific School of Harvard University, and at the universities of Göttingen and Berlin. After being director of the chemical department of Union College, Schenectady, N. Y. (1857), he was appointed professor of chemistry in the New York College of Pharmacy (1858). In 1864 he became professor of analytical and applied chemistry in the School of Mines, Columbia University, and in 1876 he was appointed to the chair of chemistry and medical jurisprudence in the College of Physicians and Surgeons. In 1865 he became chemist, and in 1873 president, of the Board of Health of the city of New York. He was made president of the American Chemical Association of the British Society of Chemistry in 1899, and of the Chemist Club in 1899. In association with his brother, Prof. W. H. Chandler, of Lehigh University, he, in 1870, established the monthly publication entitled *The American Chemist* (1870-77). His numerous papers, most of which are published in the before-mentioned journal and in the annual reports of the Health Department of New York, include: *Report on Waters for Locomotives and Boiler Incrustations* (1865); *Chemistry of Gas-Lighting* (1876); *Dangerous Kerosene; Lecture on Water* (1871); *Photo-Mechanical Processes* (1890); *Report on Dangerous Cosmetics* (1870); *Report on Petroleum as an Illuminator* (1871); *Report on the Waters of the Hudson River* (1872); *Synopsis of Organic Chemistry* (printed for the class of '65, Union College, Schenectady, 1864); *Manual of Qualitative Analysis* (pamphlet, 1873). Among the numerous reforms introduced during the administration of Professor Chandler are the segregation of slaughter-houses and the passage of the Tenement-House Act, which provides that the plans of every tenement-house must first be submitted to the Board of Health.

CHANDLER, Seth (1845—). An American astronomer, born in Boston, Mass. He was long attached to the Harvard Observatory; was awarded the gold medal of the Royal Astronomical Society of London in 1896 for his determination of the laws of the variations of latitude or movements of the earth's pole, and his researches on variable stars, of which he has prepared a catalogue. He was elected a member of the National Academy of Sciences in 1888 and is the inventor of the instrument known as the almucantar (q.v.). In 1896 he assumed the editorship of the *Astronomical Journal.*

CHANDLER, William Eaton (1835—). An American politician. He was born in New Hampshire, and graduated at the Harvard Law School in 1855. He was Speaker of the New Hampshire Legislature in 1863-64, was appointed judge-advocate-general of the navy in 1865, and was First Assistant Secretary of the Treasury under Secretary McCulloch from 1865 to 1869. He was Secretary of the Navy from 1882 to 1885, and it was during his administration that the building of the modern navy was begun. From 1881 to 1901 he was United States Senator from New Hampshire.

CHANDLER, Zachariah (1813-79). An American merchant and politician. He was born at Bedford, N. H., was educated in a common school, and in 1833 removed to Detroit, Mich., where he became a wealthy and prosperous dry-goods merchant. He was an active member of the Whig Party, and in 1851 was elected mayor of the city. In 1852 he was nominated for Governor, but was defeated. He took an active part in the organization of the Republican Party, and in 1857 was sent to the United States Senate, where he soon became conspicuous as a radical opponent of all schemes for the extension of slavery. When the Civil War broke out he was one of the foremost advocates of a vigorous prosecution of hostilities, and urged that 500,000 volunteers instead of 75,000 be called for at the start. He was reëlected to the Senate in 1863 and again in 1869; served as Secretary of the Interior in the Cabinet of President Grant from 1875 to 1877; was chairman of the Republican National Committee in 1876, taking an active part in the Presidential campaign; and in February, 1879, was again elected to the Senate, where he soon attracted general attention by a virulent attack on Jefferson Davis. He died suddenly in Chicago, whither he had gone to make a political speech. He was a man of great force and of unusual administrative capacity, but excited widespread antagonism by his radicalism in politics and by his unscrupulousness as a political manager.

CHANDOGYA, chŭn′dō-jĭ′ȧ. In Hindu literature, the name of a Brahmana of the Samaveda, in ten books, of which the eight known in Europe up to the present day form the important *Chandogya Upanishad*, treating of the values of the sacred syllable Om. It has been translated by Müller in Vol. I. of the *Sacred Books of the East*.

CHANDRAGUPTA, chŭn'drȧ-gōōp'tȧ. See Sandrocottus.

CHANDRAKANTA, chŭn'drȧ-kän'tȧ (Skt., beautiful as the moon, from *candra*, moon + *kānta*, lovely, from *kam*, to love). The moonstone; a jewel, in Hindu legend, said to be formed of congealed moon-rays and to be dissoluble under that planet's light.

CHAN'FRON. See Chamfron.

CHANGARNIER, shäN'gär'nyā', Nicolas Anne Théodule (1793-1877). A French general, born at Autun. He was educated at the military school of Saint-Cyr, entered the army, and took part, in 1823, in the Spanish expedition. In 1830 he went as captain to Algeria, where he distinguished himself, and rose to the rank of general of division. After the Revolution of 1848 he superseded Cavaignac (q.v.) as Governor of Algeria, but when chosen a member of the National Assembly he returned to Paris in the same year and was appointed commander-in-chief of the National Guard, and, when Louis Napoleon became President, of the troops in Paris. He was a member of the Assembly, and held at the same time his double office in the army, until the coup d'état of December, 1851, when he was exiled. He returned to France in 1859 after the proclamation of general amnesty. On the outbreak of the Franco-German War, Changarnier offered his services to the Government, but they were rejected by Marshal Lebœuf, the Minister of War. In August, however, the Emperor asked him to join the army of Bazaine. He assisted in the defense of Metz, and was employed by Bazaine in the negotiations with Prince Frederick Charles which led to the capitulation of Bazaine's army, on October 27, 1870. He returned to France in 1871 and served in the Assembly until 1873, when he participated in the proceedings which caused the downfall of Thiers. In 1875 he voted against the constitutional law recognizing the Republic, and in the Senate, of which he was made a life member, in the same year, he showed himself an enemy of Republican institutions. He died in Paris, February 14, 1877.

CHANG-CHOW, chäng'chou'. The capital of the Department of Chang-chow, Fu-kien, China, on the Kiu-lung estuary, 35 miles west of Amoy (Map: China, E 7). It is a walled city, inclosed within a circuit of 4½ miles, and has broad granite-paved streets with fine stores. The chief building is a Buddhist temple, dating from the Eighth Century. A wooden bridge nearly 800 feet long, resting on twenty-five stone piles, spans the river. The town has manufactures of silk, sugar, crystal, and bricks, and carries on an extensive domestic and export trade in tea and sugar. Population, estimated, between 900,000 and 1,000,000.

CHANGELING. It was at one time a common superstition that infants were taken from their cradles by fairies, who left instead their own weakly and starving elves. The children so left were called *changelings*, and were known by their peevishness, and their backwardness in walking and speaking. As it was supposed that the fairies had no power to change children that had been christened, infants were carefully watched until such time as that ceremony had been performed. This superstition is alluded to by Shakespeare, Spenser, and other poets.

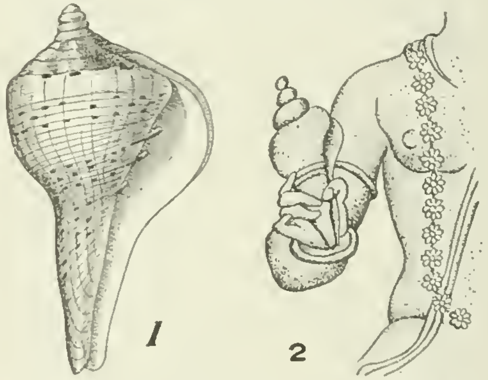
CHANGELING, The. A drama, by Middleton and Rowley, produced in 1623, and published in quarto in 1653. After the Restoration, in 1661, it was successfully revived. It is in great measure founded on an episode in Reynolds's *The Triumphs of God's Revenge*.

CHANGE-OF-DAY LINE. See International Date-Line.

CHANGO, chäṅ'gō. A dwarfish tribe living in the rainless coast region bordering upon the desert of Atacama, northern Chile. They subsist entirely upon sea-food. The men are said to average but four feet nine inches in height. Little is known concerning their language.

CHANG-SHA, chäng'shä'. Capital of the Chinese Province of Hu-nan, situated on the Sian-kiang, about 350 miles north of Canton (Map: China, D 6). It is surrounded by a wall and has an important silk industry. Population, estimated at 300,000.

CHANK-SHELL (Hind. *śankh*, from Skt. *śankha*, conch-shell). The top-shaped shell of any of several gastropod mollusks of the genus Turbinella, specifically *Turbinella pyrum*. They are obtained chiefly by diving in water 12 or 15 feet deep, along the coasts of southern India and Ceylon, the chief fishery being at Tuticorin, on the Gulf of Manar, where about 325,000 are obtained each winter, and are chiefly sent to Dacca. They are much used as ornaments, often elaborately carved, by Hindu women, the arms and legs being encircled with them; and many of them are buried with the bodies of opulent persons. This esteem among the Hindus is due to the fact that the shell is a sacred emblem of Vishnu, who is usually represented as holding one.



1. Chank-Shell. 2. Arm of Vishnu, with Chank-Shell.

CHANLER, William Astor (1867—). An American politician and traveler, born in Newport, R. I. After expensive foreign tours, he undertook, with Chevalier Ludwig von Höhnel, the exploration of the region east and west of Mount Kenia, in Africa. They left Zanzibar in September, 1892, and reached the coast again in July, 1893. Their experiences and scientific work on this trip Chanler embodied in his book, *Through Jungle and Desert* (1896). Upon his return to the United States, he entered political life and became a member of the New York State Legislature, from the Fifth Assembly District in 1897, and from the Fourteenth in 1899. He served with special commendation from Shafter, general in command, in the battles before Santiago, Cuba (July 1-2, 1898).

CHANLIEU, shän'lyē', GUILLAUME AMFRYE (1639-1720). A French poet, born at Fontenay Vexin Normand). He was one of the dissolute abbés so common at that period of French literature, and was called by his contemporaries 'L'Anacréon du Temple.' Voltaire speaks highly of his verses, which have a grace and facility that make them still read. The best edition is that of the Marquis de la Fari (1774).

CHANNEL, OF A STREAM. The hollow or depression between the banks through which the water flows. A river may have several channels in parts of its course. In such a case, the main channel has been defined by judicial authority to be "that bed of the river over which the principal volume of water flows." It may or may not be coincident with the deepest water or the best currents for navigation. See RIPARIAN RIGHTS; RIVER.

CHANNEL, or **CHANNELING** (OF. *chanel*, from Lat. *canalis*, groove, connected with Skt. *khan*, OPers. *kan*, to dig). The name given to the curved grooves of columns which are cut in parallel rows. It is usual to distinguish the channels in a Doric column, which adjoin one another, from the flutes of the Ionic and Corinthian columns, which are separated by an arris. See COLUMN.

CHANNEL. See ENGLISH CHANNEL.

CHANNEL BASS. A sciænid fish. See REDFISH.

CHANNELBILL. A large Australian cuckoo (*Scythrops Novæ-Hollandiæ*), having a very large and curiously grooved beak, so that it was long considered a species of hornbill. See Plate of CUCKOOS.

CHANNEL CAT. See CATFISHES.

CHANNELING-MACHINES. See QUARRYING.

CHANNEL ISLANDS (Fr. *l'Archipel de la Manche*, the Channel Archipelago). A group of islands geographically connected with France, but politically attached to Great Britain, in the English Channel, to the west of the peninsula of Cotentin. The islands lie 10 to 30 miles distant from the Normandy coast, and 50 to 120 miles south of the English coast (Map: France, D 2). They comprise Jersey, Guernsey, Alderney, and Sark, and a number of islets. Their combined area is about 75 square miles.

Famous for their strategic position, history, antiquities, genial climate, and picturesque and varied scenery, they constitute favorite and fashionable resorts for English, French, and even American invalids and tourists. The small and highly cultivated farm holdings, ranging from 5 to 12 acres, and the good military roads, give the islands the appearance of carefully laid out pleasure grounds, and gained from Victor Hugo, long a resident, the designation of 'gardens of the sea.' The principal industry is agriculture. The soil produces good crops; horticulture and floriculture flourish, potatoes are extensively cultivated for exportation, the annual yield in Jersey exceeding 60,000 tons, valued at $1,320,000, while Guernsey supplies London and Paris with enormous quantities of fruit, grown under glass. The chief fertilizer is *vraic*, or seaweed, the regular gathering of which, controlled by legislation, is one of the characteristic insular scenes. A large quantity is used in the manufacture of kelp and iodine, its value to Guernsey being estimated at $150,000 annually. The three larger islands are noted for distinctive breeds of cattle, the purity of each breed being jealously guarded; they are remarkable for their small size, symmetry, color, and beauty, and for the yield and quality of their milk, making dairy farming a profitable industry. There are important fisheries of turbot, John Dory, conger-eels, oysters, lobsters, monster crabs, etc. The quarries of Jersey and Guernsey are extensively worked and export fine granite for building purposes. There is daily communication by steamers with various English and French ports, and an average of 3000 vessels of 200,000 gross tonnage enter and clear the Channel Island ports annually.

The geology of the islands is particularly interesting in the primary formation of granite rocks; vegetation is rich and varied, and scientists here find a comprehensive field of study in a small compass. The coasts are rocky and dangerous, and the tidal currents treacherous; lighthouses stand on the more important headlands and outlying reefs. The population in 1901 was 95,841. The chief town is Saint Helier, on the island of Jersey. Among the farming population the vernacular language is old Norman French, which differs in peculiarities of spelling and pronunciation in each island, and even in parishes of the same island. The English language predominates in the town districts, which contain a large proportion of British and many French residents. Officially attached to Hampshire, England, and the diocese of Winchester, the islands are self-governed and afford interesting examples of home rule, forming, as Freeman states, 'distinct commonwealths.' They comprise the two bailiwicks of Jersey and Guernsey—the latter including Alderney, Sark, Herm, and adjacent isles each presided over by a 'bailiff' or chief magistrate of native extraction appointed by the British Crown, and assisted by a 'States' or Legislative Assembly, comprising 'jurats' or magistrates, the rectors of the parishes, all life officers, the 'constables' or parochial mayors, and a number of 'deputies' or representatives elected for a term. Judicial affairs are managed by a royal court, consisting of the bailiff and jurats, who thus fill the anomalous dual positions of law-makers and law-dispensers. The British Government is represented by lieutenant-governors, generally army officers of distinction, who are appointed for five years, command the military forces in the islands, have the right of veto and an equal seat with the bailiff in the States Assembly, but no vote. French is the official language of the legislatures and courts, but after long opposition the optional use of English has been adopted. There are also ecclesiastical courts. Taxation is light, living is inexpensive, but military service at fixed periods is compulsory on all male natives and residents from 16 to 60 years of age.

The laws of the islands are derived from the *Coutumier de Normandie*, the islands having once formed part of the Duchy of Normandy.

They are the sole remains of that duchy, attached to the British crown, whence their independence and the humorous local contention that Great Britain is an appanage of the Channel Islands, legal documents referring to the monarch as Duke of Normandy and King of Great Britain and Ireland. The islands originally were joined to the Continent; raised beaches and other traces of disruption exist. Cave-dwellings and numerous megalithic cromlechs, tumuli, and menhirs prove the habitation of a prehistoric race; a few old Norman chapels remain: the oldest churches, Saint Brelade's, Jersey, and Saint Sampson's, Guernsey, date from 1111, and earthworks, fortifications, and castles dating from Roman and subsequent periods exist. The Romans occupied the islands during the Third and Fourth centuries; Cæsarea (Jersey), Cæsar's Isle, and Sarnia (Guernsey) occur in the itinerary of Antoninus. Christianity was introduced by Irish missionaries about A.D. 460, Saint Helier being the apostle of Jersey and Saint Sampson of Guernsey. The islands were taken by Rollo previous to his invasion of Normandy, the famous *Roman de Rou*, by Wace (q.v.), a native of Jersey, who wrote in the Twelfth Century, celebrating his deeds.

After the Conquest the islands alternated between Norman and English rule until 1204, when with the loss of Normandy they remained faithful to England and steadfastly resisted many subsequent attempts on the part of France to capture them. In Henry VI.'s reign the French held part of Jersey for six years. During the Civil War they were the scene of many notable events, Jersey remaining loyal and Episcopal, and Guernsey republican and Presbyterian. During the Revolutionary War in America a French expedition landed in Jersey in 1781, but was defeated with great loss. During the French and American wars, when shipbuilding was an important local industry, the islanders fitted out many privateers, and, in Burke's words, became "one of the naval powers of the world," capturing many rich prizes. The islands are favorite asylums for political refugees. Their numbers have included Charles II., Earl Clarendon, Victor Hugo, and General Boulanger. Population, in 1891, 92,200; in 1901, 95,800. Consult: Urquhart, *Channel Islands, Norman Law* (London, 1844); Pegot-Ogier, *Histoire des Iles de la Manche* (Paris, 1881); Ansted and Latham, *The Channel Islands* (London, 1896); De Cléry, *Les îles normandes* (Paris, 1898); and see separate articles, ALDERNEY; JERSEY; GUERNSEY; and SARK.

CHAN'NING, EDWARD (1856—). An American historian. He was born in Dorchester, Mass., and in 1878 graduated at Harvard, where he became instructor in history in 1883, assistant professor in 1887, and professor in 1897. His publications include: *Town and County Government in the English Colonies* (1884); *The United States of America* (1896), in the "Cambridge (Eng.) Historical Series"; and two excellent text-books, *A Student's History of the United States* (1897), and *A Short History of the United States for School Use* (1900). He has collaborated with Justin Winsor in the publication of Vols. II., VI., and VII. of the *Narrative and Critical History of America* (1886-89), with T. W. Higginson in *English History for Americans* (1893), and with A. B. Hart in the *Guide to the Study of American History* (1896).

CHANNING, EDWARD TYRREL (1790-1856). An American scholar, the brother of William Ellery Channing. He was educated at Harvard, and began the practice of law in Boston, but devoted his attention chiefly to literature. From 1817 to 1819 he edited the *North American Review*, and was a regular contributor to it through a large part of his life. He was professor of rhetoric and oratory in Harvard College from 1819 to 1851. A volume of his lectures was published in 1856 with a memoir by R. H. Dana.

CHANNING, WILLIAM ELLERY (1780-1842). An American Unitarian preacher and author. He was born April 7, 1780, in Newport, R. I., entered Harvard at the age of fifteen, and took his degree in 1798. He taught for two years in Richmond and then studied divinity. In 1803 he was ordained minister of Federal Street Church in Boston. During the earlier years of his ministry his theological peculiarities had little prominence in his discourses, and in consequence he stood upon friendly terms with his brethren in more orthodox churches. In 1819, however, he preached a sermon at the ordination of the Rev. Jared Sparks, in which he pointed out the inadequacy of the Calvinistic theology then current, and advocated the Unitarian doctrine with so much zeal and ability that he was termed 'the apostle of Unitarianism.' This involved him in a controversy, a thing which he naturally loathed. To the end of his life he preserved a devoutly Christian heart, shrinking with the delicate instinct of a refined nature from everything cold, one-sided, and dogmatic, whether Unitarian or Trinitarian. As late as 1841, he wrote, "I am little of a Unitarian, have little sympathy with the system of Priestley and Belsham, and stand aloof from all but those who strive and pray for clearer light." In 1821 he received the title of D.D. from Harvard University, on account of the great talent he had exhibited in his tractates on the Evidences of Christianity and of Revealed Religion, his address on War, and his Sermons. In 1822 he visited Europe, and made the acquaintance of several English authors, among them Wordsworth and Coleridge, both of whom were strongly impressed in his favor. Coleridge said of him: "He has the love of wisdom and the wisdom of love." In 1823 he published *Remarks on National Literature*; in 1826, *On the Character and Writings of John Milton*; in 1829, *On the Character and Writings of Fénelon*; in 1835, an essay on *Negro Slavery*, strongly opposing it from the moral point of view; and in 1838, an essay on *Self-Culture*. Besides these he wrote a variety of other essays and treatises, all characterized by vigor, eloquence, pure taste, and a lofty tone of moral earnestness. He died October 2, 1842, at Bennington, Vt. His complete works have been several times reprinted (e.g. in one volume, Boston, 1875). More important than his purely theological speculations was the public exercise of a wide influence on his contemporaries in regard to social and philanthropic questions and the organization of charity, in the interest of peace, of temperance work, and of education, the ethics of political life, and the question of slavery. In the last-named matter, while never taking the extreme abolition position, he gave much moral support to the movement; and in concert with Emerson and other great intellectual leaders, was a great factor in the strenuous New England life of the middle of the Nineteenth Century. An interesting memoir of him was published by his nephew, William Henry Channing (3 vols., London, 1848, and reprinted in Boston, 1880).

CHANNING, William Ellery (1818-1901). An American journalist, poet, and essayist, a nephew of the great Unitarian preacher of the same name. He was born in Boston, was educated at Harvard, and was for many years connected with various newspapers and magazines. He published volumes of poems, and in prose: *Youth of the Poet and Painter; Thoreau, the Poet-Naturalist* (1873); and *Conversations in Rome Between an Artist, a Catholic, and a Critic* (1847).

CHANNING, William Henry (1810-84). An American Unitarian clergyman and author. He was born in Boston, Mass., May 25, 1810, and was a nephew of William Ellery Channing. He graduated at Harvard in 1829, at Cambridge Divinity School in 1833, and was ordained in charge of a Unitarian church in Cincinnati in 1835. After filling several pastorates in the United States, he succeeded (1857) James Martineau as minister of the Hope Street Unitarian Chapel, Liverpool, England. At the commencement of the Rebellion he returned (1862) and took charge of the Unitarian church in Washington, D. C. He was one of the early supporters of the socialistic movement in this country, was editor of *The Present* and *The Harbinger*, and in 1848 presided over a socialistic association in Boston. He was a prolific writer, contributing to the *North American Review, The Dial, The Christian Examiner*, and other serials. Among his larger works are a translation of Jouffroy's *Ethics* (1840); *Memoir of* [his uncle] *William Ellery Channing* (3 vols., 1848); *Memoir of* [his cousin] *the Rev. James H. Perkins* (1851); *Memoir of Margaret Fuller Ossoli* (in conjunction with Emerson and J. F. Clarke) (1852). He died in London, December 23, 1884. For his life, consult O. B. Frothingham (Boston, 1886).

CHANSON DE ROLAND, shäN'sôN' de rô'-läN' (Fr., song of Roland). The best-known and oldest of the extant French *chansons de geste* (q.v.); the type of the class in its best and purest form. It was written demonstrably not later than 1095, possibly as early as 1066. The supposed author's name is given in the text as Turoldus, but he has not been otherwise identified. The poem, which consists of about 4000 lines, deals with the death of Roland at Roncesvalles, and its avenging by Charlemagne. The only ancient manuscript still preserved, dating probably from 1170, is in the Bodleian Library at Oxford. It was first edited in modern times by Michel (Paris, 1837), but more recent scholars have added much to our knowledge. Consult especially the editions by Müller (Göttingen, 1878); Léon Gautier (Tours, 1872 et seq.); and Stengel (Heilbronn, 1878); and Seelmann, *Bibliographie des altfranzösischen Rolandsliedes* (Heilbronn, 1888).

CHANSONS DE GESTE or **GESTES,** zhâst (Fr., songs of achievement or adventure). The name generally given by scholars to the large and important class of epic poems which sprang into existence in France in the latter part of the Tenth Century or the beginning of the Eleventh. The history of their origin is obscure, and there is no evidence for the existence of preceding ballads out of which they were compiled. The earlier ones are written in decasyllabic iambic lines, arranged in groups (called in French *laisses* or *tirades*) of varying number, connected by assonance or vowel-rhyme, the consonants of the final syllables not being the same. This assonance was soon replaced by rhyme, and the ten-syllable line about 1200 by the twelve-syllable or Alexandrine, which is said to take its name from the poem *Alexandre le Grand*, by Alexandre de Bernay and Lambert le Tors. Their subject is uniformly French history, treated in a romantic spirit, and generally centring around Charlemagne as the epic hero. As their name implies, they were composed, not to be read, but to be sung or recited. About 110 of them are preserved, averaging 6000 lines apiece. Excepting the oldest and best-known, the *Chanson de Roland* (q.v.), and the Thirteenth-Century *Fierabras*, the following, all of the Twelfth Century, are the best in the judgment of the most competent critics: *Aliscans, Amis et Amiles, Antioche, Berte aux grans Piés, Garin le Loherain, Gerard de Roussillon, Huon de Bordeaux, Ogier de Danemarche, Raoul de Cambrai*, and the *Voyage de Charlemagne à Constantinople*. Consult: Léon Gautier, *Les épopées françaises* (2d ed., 4 vols., Paris, 1878-94); id., in Petit de Julleville, *Histoire de la langue et littérature française* (Paris, 1896-98); Rajna, *Le origini dell' epopea francesca* (Florence, 1884); Saintsbury, *The Flourishing of Romance and the Rise of Allegory* (New York, 1897); G. Paris, *Histoire poétique de Charlemagne* (Paris, 1865); and see French Literature; Trouvère; Jongleur.

CHANT (Fr. *chant*, from Lat. *cantus*, from *canere*, to sing). A form of choral music between singing and recitative and especially used for litanies and psalms in the Roman Catholic and Protestant Episcopal service. The chant is the ancient style of church song, certainly as old as Christianity, which seems to have inherited it from the Jewish Church. The ancient Persians chanted or intoned their religious hymns, the Gâthâs (q.v.); Saint Paul exhorts believers to sing (to chant) psalms and hymns and spiritual songs; and Pliny the Younger mentions the early morning assembling of Christians to chant hymns to Christ. As rhymed and metrical hymns, now so common, were the product of a later art, so the tunes accompanying them are modern as compared with chants. See Ambrosian Chant; Gregorian Chant; Plain Chant.

CHANT, Laura Ormiston (1848—). An English lecturer and reformer, born at Chepstow. She was at various times a teacher, nurse, student of medicine, dress-reformer, and crusader against London concert-halls. Subsequently she became known as a speaker on various social and literary themes, and at the time of the Græco-Turkish War took bands of nurses to Crete and to the Greek frontier. She visited the United States in 1896, and in many public addresses told what she was doing and purposed to do for the betterment of society in general and women in particular. Her publications include *Verona, and Other Poems* (1887).

CHANT DU DÉPART, shäN' dụ dâ'pär', Le (Fr., song of departure). A song of the French Revolution with words by Marie Joseph Blaise Chénier, music by Méhul. It was composed for the fête on the fifth anniversary of the taking of the Bastille, July 14, 1794. This is the only French national air written during the Reign of Terror, and when sung it created as great an effect as *La Marseillaise* (q.v.).

CHANTAL, shäN'täl', JEANNE FRANÇOISE FRÉMYOT, Baroness de (1572-1641). The founder of the Order of the Visitation. She was the daughter of Benigne Frémyot, president of the Parliament of Burgundy, and in her twentieth year married Christophe de Rabutin, Baron de Chantal. While out shooting, he was accidentally killed by a companion, and his widow devoted herself to the education of their four children and to the practice of virtue. In 1604 she met Saint Francis de Sales, and passed under his spiritual direction. At his suggestion, in 1610, she joined two other pious women in a community, and, when it was confirmed as an order, made the solemn vows, adding a special one always to choose, in a doubt between two actions, that which tended the most toward perfection. She died at Moulins, was buried at Annecy, and canonized by Clement XIII., in 1767. Her festival is August 21. Consult Bougaud, *Histoire de la sainte Chantal* (2 vols., Paris, 1893).

CHANTEPIE DE LA SAUSSAYE, shäN't'-pê' de lä sō'sā'. See LA SAUSSAYE.

CHANTERELLE, shäN't'-rĕl'. See MUSHROOM.

CHAN'TICLEER (OF. *Chantecler*, name of the cock in the Renart epic, from *chanter*, Lat. *cantare*, to sing + *cler*, Lat. *clarus*, clear). An imaginative name for a cock. It occurs both in Old French and Middle English. The cock in the mediæval version of Æsop, *Reynard the Fox* (q.v.), goes by this name, as does also the barnyard hero of Chaucer's *Nun's Priest's Tale*, who "had in his governance seven hennes," one of which "was cleped faire Damoselle Pertelote."

CHANTILLY, shäN'tē'yē'. A town of France in the Department of Oise, about 23 miles north-northeast of Paris. Its environs are very picturesque and the place derives additional interest from its two châteaux surrounded by a magnificent park, both of which belonged to the Condé family from 1632 to 1830. The smaller of the two châteaux is of more recent construction and is regarded as one of the finest specimens of French Renaissance. The larger château with its splendid art collections is now, through the gift of the Duc d'Aumale, in the possession of the Institut de France. The products of Chantilly are porcelain and lace. Chantilly is also a horse-racing centre, with a fine course, and noted for the three annual race meetings held here. Population, in 1901, of town, 4463; of commune, 4791. Consult "Le Château de Chantilly," in *Revue de l'art ancien et moderne*, Vol. III. (Paris, 1898).

CHANTILLY, shăn-tĭl'lĭ. A post-village in Fairfax County, Va., 20 miles west of Washington, where, during a furious thunder-storm on September 1, 1862, after the second battle of Bull Run (q.v.), an indecisive engagement occurred between a part of Pope's army under Generals Hooker, Reno, and Kearny, and two divisions of Lee's army under General Jackson. On the following day the Federal troops were withdrawn to the fortifications about Washington. Each side lost heavily, and among the Federal dead were Generals Isaac J. Stevens and Philip Kearny.

CHANTRY (OF. *chanterie*, Med. Lat. *cantaria*, chantry, from Lat. *cantare*, frequentative of *canere*, to sing). A foundation to provide masses for the repose of the soul of the patron or his friends, or the chapel or altar in a church where such service was performed. Legislation against chantries began under Henry VIII. in 1545, when they were dissolved by law and the property given to the King; but, the law being inoperative, another act was passed under Edward VI. in 1547, which had the desired effect, and the King entered into possession of the funds, which amounted to a large sum, as at the time there were a thousand such foundations in England, with certain very carefully ordained exceptions. The text of this important act is found in Henry Gee's *Documents Illustrative of the History of the English Church* (London, 1896, pp. 328-357).

CHANTREY, chăn'trĭ, Sir FRANCIS LEGATT (1781-1842). An English sculptor. He was born in the village of Norton, Derbyshire, April 7, 1781. His first modeling was done in pastry for the table of a wealthy lady named Stanley, who became interested in him and placed him with a carver and frame manufacturer in Sheffield, where Chantrey produced several admirable models in clay. He received some instruction in painting from John Raphael Smith and advertised that he would make portraits in crayon. Shortly afterwards he visited Edinburgh and Dublin without receiving much encouragement. He then went to London and studied at the Royal Academy, and in 1804 exhibited a portrait in oil. In the following year he turned his attention again to sculpture, and exhibited three busts which displayed great ability. He soon became recognized, and in 1809 Mr. Alexander, an architect, gave him an order for four colossal busts of Howe, Saint Vincent, Nelson, and Duncan, for Trinity House and the Greenwich Naval Asylum. His next work was the statue of Pitt in 1811. He soon after produced one of George III. for the city of London, which was greatly admired. He was later employed upon several statues for Saint Paul's besides designs for church sepulchres; among the latter was the monument of two children, daughters of Rev. W. Robinson, which was placed in Lichfield Cathedral. This beautiful work is Chantrey's masterpiece in that branch of art. It was exhibited in 1818 and gained the artist a unanimous election to the Royal Academy. In 1819 he visited Italy and was elected a member of the academies of Rome and Florence. He afterwards returned to London, where he was knighted in 1835. He amassed a large fortune. He died November 25, 1842. Among his unfinished works is the colossal equestrian statue of the Duke of Wellington, intended to be placed in the front of the Royal Exchange. He also left what is now known as the Chantrey Bequest, a sum of money for the purchase annually of a picture or statue by an artist resident at the time in England. Chantrey's statue of Washington is owned by the city of Boston. Chantrey produced busts or statues of many celebrated contemporaries. These works include, besides those mentioned, busts of Scott (two), James Watt, Porson, and Wordsworth; and statues of George IV. (equestrian), Sir Joseph Banks, Canning, and Roscoe. Consult: The biography by Jones (London, 1849) and Holland, *Memorials of Sir Francis Chantrey* (ib., 1851).

CHANUTE, chȧ-nōōt′. A city in Neosho County, Kan., 126 miles south-southwest of Kansas City, Mo., on the Atchison, Topeka and Santa Fé and the Missouri, Kansas and Texas railroads (Map: Kansas, G 4). The repair-shops of the former railroad are located here, and there are also a number of manufacturing plants of importance, all operated by natural gas which is found in abundance. Oil has been recently discovered, and, within a radius of two miles, there are a large number of producing wells. The city is lighted by natural gas, and owns and operates its gas plant and water-works. Settled in 1872, Chanute was incorporated 1873, and is governed under a charter revised in 1888, which provides for a mayor, elected biennially, and a city council. Population, in 1890, 2826; in 1900, 4208.

CHANZY, shäɴ′zē′, ANTOINE EUGÈNE ALFRED (1823-83). A French soldier, born at Nouart (Ardennes). He studied at the Military School of Saint Cyr, received a commission in the Zouaves, served in Algeria, and rose to the rank of major. He fought in the Lombardy campaign of 1859, and participated in the Syrian expedition of 1860-61. Commissioned general of brigade, he remained in Algeria until the outbreak of the Franco-Prussian War. His request for a brigade command was refused by the Government, but in October he obtained from the Government of National Defense the command of a division, and soon after of the Sixteenth Corps of the Army of the Loire. In December he became commander-in-chief of the Second Army of the Loire (known also as the Army of the West), and distinguished himself in the stubborn retreat from Beaugency to Laval. Upon the conclusion of the armistice he was elected to the National Assembly, and in 1872 was appointed commander of the Seventh Army Corps. From 1873 to 1879 he was Governor of Algeria, and in 1875 was elected a life Senator. In 1879 he received a third of the total vote at the Presidential election, and in 1880-81 was Ambassador at St. Petersburg. He is generally recognized as one of the most prominent figures in the conduct of the French resistance to German invasion. He published *La deuxième armée de la Loire* (1871). Consult the biographies by Chuquet (Paris, 1884) and Villefranche (Paris, 1890).

CHAO-CHAU, chou′chou′. A town in the Province of Kwang-tung, China, 15 miles north of the treaty port of Swatow (Map: China, E 7). Population, in 1898, estimated at 200,000.

CHAOS, kā′ŏs (Lat., from Gk. *χάος*, *chaos*, abyss, from *χαίνειν*, *chainein*, to yawn, *χάσκειν*, *chaskein*, to gape). In the ancient cosmogonies, the original infinite space, which was filled with cloud and darkness, from which sprang all things that exist. It gave birth to Erebus and Night, and, as a cosmic form, was the mother of Eros. In the later poets and philosophers the word *chaos* was applied to the confused, shapeless mass out of which the universe was formed into a *cosmos*, or harmonious order. *Chaos* was sometimes used also with reference to the universe as a whole, to the space between heaven and earth, and to the lower world.

CHAPALA (chȧ-pä′lȧ) **LAKE.** The largest lake in Mexico, situated in the State of Jalisco, in latitude 20° 15′ N. and longitude 103° W. (Map: Mexico, G 7). It lies at an altitude of about 6000 feet, and covers an area of about 1400 square miles. Its chief tributary stream is the Rio Lerma, which enters from the east, and its outlet is the Rio Santiago, which leaves the lake on the north side, a few miles west of the mouth of the Rio Lerma. The lake contains a number of islands. Few towns are found on its shores.

CHAPARRAL, chă′pȧ-răl′ (Sp. *chaparra*, live oak, probably from Basque *achaparra*, from *aitza*, rock + *abarra*, evergreen oak). A thorny xerophytic (dry ground) type of thicket, especially characteristic of Texas, Arizona, and the Mexicos. See THICKET.

CHAPARRAL COCK. See ROAD-RUNNER.

CHAP-BOOKS (Engl. *chap*, AS. *cēap*, bargain, Engl. *cheap*, Ger. *Kauf*, trade, Lat. *caupo*, innkeeper + books). The name given to a variety of old and scarce tracts or booklets of a homely kind, which at one time formed the only popular literature. In the trade of the bookseller they are distinguishable from the ordinary products of the press by their inferior paper and typography, and are reputed to have been sold by chapmen, or peddlers; hence their designation. The older chap-books issued in the early part of the Seventeenth Century are printed in black letter, and are in the form of small volumes. Those of a later date are in the type now in use, but are equally plain in appearance. Of either variety, they were mostly printed in London, many being without dates. They were of a miscellaneous kind, including theological tracts, lives of heroes, martyrs, and wonderful personages, interpretations of dreams, fortune-telling, prognostications of the weather, stories of giants, ghosts, hobgoblins, and witches, histories in verse, and songs and ballads. An inferior class of tracts succeeded these books for the common people, and are best known as *Penny Chap-books*. For the most part they consisted of a single sheet, duodecimo, or 24 pages. Besides the title, the first page usually contained a coarse woodcut embellishment. The paper was of the coarsest kind adapted for printing, and the price, as the name imports, was a penny each. The subjects, besides being of a similar nature to the above, included stories of roguery and broad humor. These penny chap-books were issued by an obscure class of publishers in London and several English provincial towns, particularly Newcastle-on-Tyne. They were also issued from the presses of Edinburgh, Glasgow, Falkirk, and Paisley. After 1800 the chap-books rapidly declined in popularity, their place being taken by Hannah More's *Repository Tracts*, the *Penny Magazine*, and other cheap publications. Collections of the older chap-books are now found only in the libraries of bibliophiles, by whom they have been picked up at extravagant prices from dealers in second-hand books. Consult: *Notices of Fugitive Tracts and Chap-books*, Percy Society, Vol. XXIX. (London, 1851); *Popular English Histories*, Percy Society, Vol. XXIII. (London, 1848), both edited by Halliwell; and Ashton, *A History of the Chap-books of the Eighteenth Century* (London, 1882). Other countries have their chap-books. For France, consult Nisard, *Histoire des livres populaires* (Paris, 1854); for Germany, Simrock, *Deutsche Volksbücher* (13 vols., Berlin, 1839-67; new edition, 1887).

CHAPEAU DE PAILLE, shä'pō' de pä'y' (Fr., straw hat). A painting by Rubens (q.v.), hanging in the National Gallery, London. It represents a young girl clad in a black velvet dress, her face being effectively shaded by a straw hat, broad-brimmed and plumed. The work is noteworthy, as has often been pointed out, from the fact that, despite the shadow cast by the hat, the face is brought out in the clearest and most vivid colors.

CHAPEL (OF. *chapele*, *capele*, from Med. Lat. *capella*, chapel, sanctuary for relics, probably referring to the covering of the altar during mass, from *capellus*, diminutive of *capa*, *cappa*, hood, mantle, of uncertain origin, probably not connected either with Lat. *capere*, to take, or *caput*, head). During the Middle Ages the term grew to signify a small building or room, either detached, annexed to, or an integral part of, a larger structure, and not possessing the full privileges and characteristics of a church. Ordinarily mass could be said in chapels only on certain dates, especially on their saints' days; otherwise they were mainly oratories. Baptism could never be administered in them, nor cemeteries attached to them. The extent of their privileges depended on the pleasure of the local bishop. Episcopal palaces had their chapels; one of the earliest was that at Ravenna (Fifth Century). The original Papal chapel of the Lateran Palace was the Sanctum Sanctorum. For a time the chapel in the Papal palace at Avignon served in that capacity, but now the Sistine Chapel at the Vatican has taken its place. Civil rulers also had chapels in their palaces. The Byzantine Duke of Rome had his in the old palace of the Cæsars. That of the doges of Venice was Saint Mark's. Charlemagne had his largest one at Aix-la-Chapelle, in the present cathedral; that of the mediæval emperors was at Goslar. The feudal nobility regarded a chapel as indispensable in every great castle, as at the Wartburg in Germany, Coucy in France, and later at the châteaux of the dukes of Berry and Burgundy, at Pierrefonds, Urbino, and elsewhere.

In the great communal palaces of mediæval republics there were extremely artistic chapels, as at Nuremberg, Siena, Perugia, and Florence. The great associations, such as the Knights Templars (Tortosa), Knights of Saint John (Krak der Ritter), the Prussian Knights of the Cross (Schloss Marienburg), had large chapels to hold all the members of the orders. A beautiful modern reproduction of such feudal mediæval chapels is at Neuschwanstein, in the Bavarian highlands—the masterpiece of King Ludwig. Other corporations, such as universities and guilds, either had separate structures or chapels in their larger buildings.

Another class of chapels is that connected with a church. Before the Eighth Century it was rare for chapels or oratories to form an integral part of any church, or for any altar to be erected except in the main apse, and later in each of the two side apses. But after this date, with the multiplication of relics and the increased fervor of the worship of saints, altars were multiplied in chapels which were at first excrescences from, but soon became a part of the plan of, the church itself. The richness of the choir of Romanesque and Gothic churches is due to the symmetrical projection of radiating chapels. Often the central chapel, or lady chapel, dedicated to the Virgin Mary, was longer than the rest. Sometimes a continuous line of chapels opened out of the side aisles, as in Notre Dame in Paris (Twelfth Century) and a multitude of later churches. In this way it was possible to pay special separate devotion to each saint whose relics were preserved in any church, and to allow wealthy families to build separate chapels for their patron saints. These private chapels were used as family oratories, as burial-places for its members, and were decorated with paintings and sculptures at its expense. Another class is composed of the numerous small places of prayer and worship scattered over the country and not connected with any church; such as chapels of stations of the cross, votive chapels on the site of some miracle, and wayside shrines. The term is also applied to places of worship erected by Dissenters in England, the term church being restricted by usage to the buildings of the Establishment. Our modern universities have their chapels for faculty and students, such as the Battell Chapel at Yale and the Marquand Chapel at Princeton, in imitation of the magnificent chapels possessed by each college at Oxford and Cambridge. There are also special classes of chantry, domestic, memorial, mortuary, parochial, and proprietary chapels. Consult Martin, *Manual of Ecclesiastical Architecture* (Cincinnati, 1897).

CHAPELAIN, shä'plăN', JEAN (1595-1674). A French poet and man of letters, born in Paris. He was one of the first and most influential members of the Academy. His scholarly instincts prompted him to pursue classical studies. He was for many years tutor of the sons of Grand Provost de la Trousse. He wrote a preface for Marini's notorious *Adone*, then translated the *Guzman de Alfarache* of Aleman, and by four inferior odes won from Richelieu a pension and a place in the new Academy. Here he helped Richelieu with his dramas, planned the Academy's *Grammar* and *Dictionary*, and edited its observations, made to order, on Corneille's *Cid*. In 1656 he published half of a long-heralded epic on Joan of Arc, *La pucelle d'Orléans*. His literary reputation now collapsed under a shower of epigrams from Boileau, Furetière, and Montdor. The manuscript of the latter half of the epic remains still unpublished in the National Library. Yet when, in 1662, Chapelain was asked by Colbert to draw up a memorial to guide the King in pensioning literary men, he showed himself learned, just, and generous. He continued a favorite of the Court; but though in his earlier years an excellent and amiable man, in old age he became miserly to a degree that is said to have occasioned his death. His *Lettres*, edited in part by T. de Larroque (2 vols., Paris, 1880-83), are of great interest. Consult: E. de Molènes, *La pucelle, par Jean Chapelain* (Paris, 1891); Fabre, *Chapelain et nos deux premières Académies* (Paris, 1890); and Mühlan, *Jean Chapelain: Eine biographisch-kritische Studie* (Leipzig, 1893).

CHAP'EL HILL. A town in Orange County, N. C., 12 miles southwest of Durham, on a branch of the Southern Railroad (Map: North Carolina, D 2). It is the seat of the University of North Carolina (q.v.). Settled at the close of the Eighteenth Century, the town was incorporated in 1851, and is now governed under a charter of 1899, which provides for a mayor, elected annually, and a council. Population, in 1890, 1017; in 1900, 1099.

CHAPELLE, shȧ-pĕl′, Placide Louis (1842—). An American prelate, born in the diocese of Mende, France. He studied theology and philosophy at Saint Mary's College, Baltimore, Md., was an instructor in Saint Charles's College in 1863-65, and was ordained priest in 1865. In 1870 he became assistant pastor of Saint John's Church, Baltimore, of which he was later pastor, and in 1882 pastor of Saint Matthew's, Washington, D. C. He was in 1891 appointed coadjutor bishop to Archbishop Salpointe, of Santa Fé, whom in 1894 he succeeded. In 1897 he was appointed Archbishop of New Orleans, in 1898 apostolic delegate in Cuba and Porto Rico, and in 1899 apostolic delegate in the Philippine Islands.

CHAPELLE ARDENTE, shȧ′pĕl′ är′däɴt′ (Fr., glowing chapel). A room or mortuary chapel wherein the dead body of a person of high rank, whether ecclesiastical or civil, is laid. The hangings are in black, and burning candles illuminate the scene until the final removal for burial. The custom is of great antiquity in the Catholic Church.

CHAPEL ROYAL (Fr. *chapelle rayale*). In the Church of England a chapel royal is composed of two deans (a dean and a subdean), forty-eight royal chaplains, ten priests, and a lay choir, styled 'gentlemen of the chapel,' a clerk and several deputy clerks of the closet, and an organist. The services are performed in London in the small oratory in Saint James's Palace. In Scotland the appointments to the Chapel Royal are purely honorary, involving no services and carrying with them no compensation, though formerly it was attached to the palace at Holyrood and corresponded with the similar establishment in England.

CHAPIN, Edwin Hubbell (1814-80). An American Universalist clergyman. He was born in Washington County, N. Y., received a secondary school education, and in 1837 began preaching in Richmond, Va., to a congregation of Unitarians and Universalists. In 1846 he went to Massachusetts, and two years later to New York, where he became pastor of the Fourth Universalist Church, which later became the Church of the Divine Paternity, one of the wealthiest churches in that city, and remained until his death. In 1872 he succeeded Dr. Emerson as editor of the *Christian Leader*, the principal Universalist paper. Besides his regular sermons, he delivered a great number of lectures, and published several volumes, among which are: *Duties of Young Men* (1855); *Duties of Young Women*; *Characters in the Gospels* (1852); *Hours of Communion* (1844); *Discourses on the Lord's Prayer* (1850); *The Crown of Thorns* (1860); *Discourses on the Beatitudes* (1853); *Moral Aspects of City Life* (1853); and *True Manliness* (1854).

CHAPLAIN (AS. *capellane*, OF., Fr. *chapelain*, Med. Lat. *capellanus*, chaplain, from *capella*, chapel). Originally the title of the ecclesiastic who accompanied an army and carried the relics of the patron saint. (See Chapel). It has now come to signify a clergyman not having charge of a parish, but employed to officiate at court, in the household of a nobleman, or in an army, garrison, ship, etc. Such officials began early to be appointed in the palace of the Byzantine emperors. The practice afterwards extended to the Western Empire, and to the courts of petty princes and even of knights, and continued to subsist after the Reformation. Forty-eight clergymen of the Church of England hold office as chaplains of the sovereign, four of whom are in attendance each month. Six clergymen of the Church of Scotland have a similar title in Scotland; but their only duty is to conduct prayer at the elections of Scotch representative peers. A statute of Henry VIII. limits the right of nominating private chaplains in England; thus, an archbishop may have eight, a duke six, a baron three; and chaplains so appointed have certain privileges, and may hold two benefices with cure of souls.

CHAPLAIN. A military clergyman, having the rank and status of a non-combatant officer. In the United States Army, chaplains are appointed by the President and assigned or transferred by the Secretary of War. Usually they are attached to the various army posts of the departments, under the department commander, who is authorized to recommend to the Secretary of War such transfer of the chaplains in his command as may be deemed for the best interests of the service. By act of Congress, approved February 2, 1901, it is provided that the establishment of chaplains shall consist of 57 men, apportioned as follows: One to each regiment of cavalry and 45 to the infantry and 12 to the artillery corps. They receive the rank and pay of a captain of infantry, are chosen from all religious denominations, and must not have passed the age of 40 on date of appointment. Chaplains are required to render to the adjutant-general of the army monthly reports of duties performed, and keep a record of all marriage, baptismal, and funeral services performed by them. In time of war, or on active service, chaplains are assigned to the various units of command.

In the United States Navy there are 24 chaplains, who perform religious duties on board naval vessels; 4 with the rank of captain, 7 with the rank of commander, and 13 with the rank of lieutenant. The pay of a chaplain during the first five years after date of his commission is $2500 per annum while at sea, $2000 when on shore duty, and $1600 when on leave or awaiting orders; the corresponding rates of pay after five years are $2800, $2300, and $1900.

Chaplains are a part of the establishment of all European armies, attendance at the regulation religious services conducted by them being compulsory for all officers and men, except in the French Army and Navy. In the British Army the Chaplain's Department is under the control of the chaplain-general.

CHAPLEAU, shȧ′plō′, Sir Joseph Adolphe (1840-98). A Canadian politician. He was born at Sainte Thérèse de Blainville, Quebec, was educated at the colleges of Terrebonne and Saint Hyacinthe, and in 1861 was called to the bar. He sat in the Quebec Legislature for Terrebonne, and was at different times Solicitor-General, Provincial Secretary, Provincial Premier, and Minister of Agriculture and Public Works in the Government of Quebec. In 1882 he entered the Cabinet of Canada as Secretary of State, under Sir John Macdonald. This office he held until 1892, when he was appointed Minister of Customs, and subsequently Lieutenant-Governor of Quebec. For some years he occupied the chair of international law in the Montreal section of Laval University. In politics he was a determined Conservative, and as an orator he was perhaps the most brilliant among French Canadians.

CHAPLET (OF. *chapelet*, dim. of *chapel*, Fr. *chapeau*, hat, from Med. Lat. *capellus*, hood, dim. of *capa*, *cappa*, hood, mantle). A garland or head-band of leaves and flowers. In heraldry, a chaplet is always composed of four roses, the other parts being leaves.

CHAPLIN, shȧ'plăɴ'. Charles (1825-91). A French painter and engraver. He was born of English parents at Les Andelys, France, and became a French citizen. He studied at the École des Beaux-Arts, and painted decorations in the Tuileries, the Elysée, and other public and private buildings in Paris. His portraits of women are much praised, and he has been called 'the painter of the boudoir.' Chaplin was a popular teacher. His pictures, "Souvenirs" and "Les balles de savon," are in the Luxembourg. He etched after Rubens, Watteau, and some of his own works.

CHAPMAN (AS. *cēapman*, trader, OHG. *choufmann*, Ger. *Kaufmann*, from *cēap*, barter, business + *mann*, man). A trader, but popularly applied in a more limited sense to a dealer in small articles, who travels as a peddler or attends markets. Chapman is from *chap*, equivalent to *cheap*, a word which in its origin signified a market or place for trading: hence, *Cheapside*, *Eastcheap*. See Chap-books.

CHAPMAN, Alvan Wentworth (1809-99). An American botanist. He was born at Southampton, Mass., and graduated at Amherst College in 1820. He was a botanist of exceptional ability, and a botanical genus, the 'Chapmannia,' has been named after him. He published the work entitled *Flora of the Southern United States* (1860).

CHAPMAN, Frank Michler (1864—). An American ornithologist, born at Englewood, N. J. He was appointed assistant curator in vertebrate zoölogy in the American Museum of Natural History, New York City, in 1887. In 1897 he was elected to the presidency of the Linnæan Society, of New York. He has made some excellent close-range photographic studies of bird-life, and in addition to many contributions to *The Auk*, of which he became associate editor, and to *Bird Life*, of which he has for some time been editor-in-chief, he has published a *Handbook of Birds of Eastern North America* (1895), *Bird Life, a Guide to the Study of Our Common Birds* (1897), and *Bird Studies with a Camera* (1900).

CHAPMAN, George (c.1559-1634). An English poet and dramatist, born near Hitchin, Hertfordshire. According to Wood, he studied at Oxford and Cambridge. In 1598 he was already known as a successful playwright. Among his earliest and best plays are: *The Blind Beggar of Alexandria* (printed 1598); *All Fools* (printed 1605); *Eastward Hoe!* in collaboration with Jonson and Marston (1605); *The Gentleman Usher* (1606); *Bussy d'Ambois, a Tragedy*, the most popular of all (1607); *Conspiracy and Tragedy of Charles, Duke of Byron* (1608); *May Day* (1611); *The Widow's Tears* (1612); and *Cæsar and Pompey* (1631). Though Chapman's plays are usually weak in plot and in the development of character, they abound in striking passages. Besides plays, Chapman wrote much else: *The Shadow of Night* (1594); *Ovid's Banquet of Sence* (1595); *De Guiana, Carmen Epicum* (1596); a continuation of Marlowe's *Hero and Leander* (1598); *The Tears of Peace* (1609), and several other poems. He is, however, best known as the first translator of Homer into English verse. The *Iliad* appeared in installments (1598-1611); likewise the *Odyssey* (1614-15). Both were published together in 1616. For the former, Chapman employed rhymed verse of seven accented syllables; for the latter, rhymed verse of five accented syllables. The translation of the *Iliad* has been criticised for its inaccuracy. On the other hand, it has been praised for its rapid movement and it is a noble poem. The complete works of Chapman, in three volumes, were edited by Shepherd, with an elaborate introductory essay by Swinburne (London, 1874-75). A literal reprint of the plays was published by Pearson (London, 1873). Selections from the plays are to be found in the "Mermaid Series," edited by Phelps (London and New York); Swinburne, *George Chapman: A Critical Essay* (London, 1875); and Matthew Arnold, essay "On Translating Homer" (1885). Consult Coleridge, *Literary Remains*, Vol. I. (London, 1836-39).

CHAPMAN, Mrs. Maria (Weston) (1806-85). An American reformer, prominent as an Abolitionist during the anti-slavery struggle. She was born in Weymouth, Mass., was educated partly there and partly in England, and in 1829-30 was principal of the Young Ladies' High School in Boston, Mass. In 1830 she married Henry G. Chapman, who died twelve years later. After 1834 she was active as an Abolitionist, writing much for the press and speaking occasionally in public. She was treasurer for several years of the Massachusetts Anti-Slavery Society, and was the editor of *The Liberty Bell*, an anti-slavery annual, which, says Samuel J. May, "year after year rung out the clearest notes of personal, civil, and spiritual liberty." She wrote the pamphlets *Right and Wrong in Massachusetts* and *Right and Wrong in Boston*, which had a wide circulation, and compiled the official anti-slavery hymn-book, *The Songs of the Free*. From 1848 to 1856 she lived in Paris, France. She was an intimate friend of Harriet Martineau, and published the latter's *Autobiography, with Memorials*, in 1877. Lowell, in his "Fable for Critics," characterizes her as follows:

> There was Maria Chapman, too,
> With her swift eyes of clear steel blue,
>
> * * * * * * *
>
> A noble woman, brave and apt,
> Cumæa's sybil not more rapt,
> Who might with those fair tresses shorn
> The Maid of Orleans' casque have worn,
> Herself the Joan of our Arc,
> For every shaft a shining mark.

CHAPONE, Hester (1727-1801). An English essayist. She wrote a short romance in her ninth year, and while still very young became proficient in Italian, Latin, music, and drawing. She wrote for the *Rambler*, *Adventurer*, and *Gentleman's Magazine*, but is best remembered by her *Letters on the Improvement of the Mind* (1772), which went through many editions. In

1760 she married Mr. Chapone, an attorney, who died ten months afterwards. Her *Works, with a Life Drawn Up by her Own Family,* appeared in 1807, in four volumes.

CHAPPAUL. See SQUAW-FISH.

CHAPPE, shȧp, CLAUDE (1763-1805). A French inventor, born in Rouen, who, in 1792, contrived the first working ocular telegraph of importance. His invention (called a 'semaphore') consisted of an upright post, on the top of which was fixed a transverse bar, and at the ends of the bar two smaller arms movable on pivots. The position of the bars represented letters or words; and, by means of such machines placed at remote but easily visible points, messages were conveyed fifty leagues in a quarter of an hour. Until almost the period of electric telegraphy the machine was used for military purposes, and especially for noting the arrival of ships, in nearly all the countries of Europe. A similar invention had, however, been produced by Hooke as early as 1684, and Chappe was so harassed by charges that he had stolen his ideas from others that he committed suicide.

CHAPPE D'AUTEROCHE, shȧp' dō'trōsh', JEAN (1722-69). A French astronomer, born at Mauriac, Auvergne. He was ordained to the priesthood, but afterwards devoted himself to astronomy. In 1761 he observed the transit of Venus at Tobolsk, on which phenomenon he published the report entitled *Voyage en Sibérie fait en 1761* (2 vols., Paris, 1768). In reply to the unfavorable opinions on Russia expressed in this work, Catharine II. and Shuvaloff caused the publication of the refutation entitled *Antidote ou examen du mauvais livre superbement imprimé, intitulé: Voyage de l'abbé Chappe d'Auteroche* (1771). Chappe's report on the transit of Venus, as observed by him in California in 1769, was published in Paris (1772).

CHAPPED HANDS. A form of eczema produced by undue exposure to extremes of cold and heat, and affecting chiefly the most exposed joints, over which the skin swells and cracks, with itching, pain, and heat. In the most severe cases there is ulceration, which is difficult to heal in proportion to the length of time the disease has been neglected. Chapping may generally be avoided if the hands are washed always with tepid water, and not habitually exposed to great cold, or, when cold, to the heat of a fire, or kept clean and not washed very frequently, and always thoroughly dried. When formed, they may be treated with oxide of zinc ointment; or with dilute solution of borax in glycerin and water; or with glycerin alone, slightly diluted with water; the hands being in any case habitually covered with buckskin or kid gloves in cold weather.

CHAPRA, or **CHUPRA**, chŭp'rȧ. A town in India, in the Province of Behar, Bengal, on the north bank of the Ganges, 35 miles northwest of Patna (Map: India, D 3). It extends nearly a mile along the river, and has several pagodas, mosques, and churches. There is trade in cotton, sugar, and saltpetre. Population, in 1891, 57,352; in 1901, 45,400.

CHAPTAL, shȧp'tȧl', JEAN ANTOINE, Count de CHANTELOUP (1756-1832). A French chemist and statesman. He studied medicine and chemistry, and became professor of chemistry at Montpellier. Subsequently, he established chemical works near there, and acquired celebrity for producing chemicals which had hitherto been imported. It is said that the Spanish Government offered him a large pension to go to Spain, and his biographer relates that Washington wrote repeatedly to Chaptal inviting him to come to America. During the Revolution the Committee of Public Safety put him in charge of the saltpetre works of Grenelle. After the 18th Brumaire (November 9, 1799) he was made a councilor of State by Napoleon, and succeeded Lucien Bonaparte as Minister of the Interior, in which capacity he established chambers of commerce, a school of arts, and in many ways contributed to the material development of the country. In 1804 he lost Napoleon's favor, but he was recalled the following year and made a member of the Senate. On Napoleon's return from Elba, Chaptal was made Director-General of Commerce and Manufactures and Minister of State. The downfall of the Empire sent him to private life. He wrote a treatise on applied chemistry which was translated into the principal European languages. Consult Flourens, *Eloges historiques* (Paris, 1856-62).

CHAPTER. A stated assembly of monks or canons; from this, the canons and other dignitaries of a cathedral or collegiate church, considered as the council of the bishop. The name arose from the practice of reading at daily meeting a chapter of the rule under which the monks or canons lived. It is applied in modern usage to the body of canons, whether in a Roman Catholic or Anglican cathedral. They have special stalls assigned to them in the choir of the cathedral, and usually a house in the precincts. The obligations of members of the chapter are substantially the same in both, and include daily participation in divine service, residence during a fixed portion of the year, and assistance in the deliberations of the body. Roman Catholic canons are distinguished by the title 'very reverend,' and by permission to wear the rochet and mozetta in choir. The bishop in both churches may appoint honorary canons, who are not members of the chapter. It was formerly the custom so to appoint secular princes; thus the Emperor was always an honorary canon of Cologne. Consult Bouix, *De Capitulis* (Paris, 1852).

CHAPTER COFFEE-HOUSE. An Eighteenth Century resort for wits and literary men. Its site is on the south side of Paternoster Row, London, situated at the corner of Chapter-House Court, Saint Paul's. It is at present a tavern.

CHAPTER-HOUSE (Engl. *chapter*, Fr., OF. *chapitre*, from Lat. *capitulum*, chapter, dim. of *caput*, head + *house*). The building in which the monks and canons of monastic establishments, and the dean and chapter of cathedral and collegiate churches, meet for the management of the affairs of their order or society. (See CATHEDRAL; CHAPTER.) Chapter-houses frequently exhibit the most elaborate architectural adornment; as, for example, those at York, Southwell, and Wells. The original stained-glass windows remain at York, and are of exquisite beauty. On the walls of that at Westminster the original fresco-painting has been discovered. Chapter-houses are of various forms; those at York and Westminster are octagonal;

those at Oxford, Exeter, Canterbury, Gloucester, etc., are parallelograms; Lichfield is an oblong octagon; Lincoln, a decagon; and Worcester, a circle. They are always contiguous to the church, and are generally placed to the west of the transepts. They generally either open into the church, or are entered by a passage. Chapter-houses were often used as places of sepulture, and have sometimes crypts under them, as at Wells and Westminster.

CHAPTERS, The Three. The name given to the condemnation issued by the Emperor Justinian in 544 against the three persons or writings—viz. (1) the person and writings of Theodore of Mopsuestia; (2) the writings of Theodore against Cyril and for Nestorius; (3) the letter which Ibas of Edessa is said to have written to the Persian Maris. The word 'chapter' in this use was understood to mean a form of anathema which threatened with excommunication every one who maintained the deprecated doctrine. The Emperor interfered in the theological disputes of the period in the interest of orthodoxy. Unwittingly he stirred up a great controversy, because he seemed to be condemning the Council of Chalcedon (451).

CHAPU, shá'pụ', Henri Michel Antoine (1833-91). A French sculptor, born at Lemée, Seine-et-Marne. He studied in Paris under Pradier, Duret, and Cogniet, and received the Grand Prix de Rome in 1855. He devoted himself largely to subjects of a mythological and allegorical character, and executed many fine works, among which may be mentioned: "Jeanne d'Arc at Domrémy" (Luxembourg Gallery); statue of "Youth" for the monument to Henri Regnault; statue of the novelist Flaubert; and "The Cantata" for the façade of the Grand Opéra, Paris.

CHAPUL'TEPEC (Aztec, hill of the grasshoppers). A small hill, 3 miles southwest of the city of Mexico, rising about 150 feet above the surrounding plain. On it the Aztec monarchs are said to have made their summer home; and here, in 1785, Galvez, then Viceroy of Mexico, began to erect an imposing fortified castle, which, though never fully completed, was used after 1822 as a military school. In the war between Mexico and the United States the hill was strongly fortified by the Mexicans, and was the scene (September 12-13, 1847) of the last serious conflict of the war. After the battle of Molino del Rey (q.v.), Scott planned a movement against Chapultepec, and on September 12 opened a heavy bombardment, under cover of which, on the following day, Generals Pillow and Quitman, supported respectively by Generals Worth and Smith, made gallant assaults, the former carrying the fortifications on the west and the latter on the southeast; and the Mexicans, after making a stubborn defense, were driven in confusion back toward the city. On the 14th the Americans entered the City of Mexico, and the war was virtually ended. During the three days (12th, 13th, and 14th) the Americans lost 863 in killed and wounded (General Pillow being among the latter), while the Mexicans are known to have lost a much larger number. On the side of the Americans about 7500 men were engaged; on the side of the Mexicans, about 4000. Consult: H. H. Bancroft, *History of Mexico*, Vol. V. (San Francisco, 1885), and C. M. Wilcox, *History of the Mexican War* (Washington, 1892).

CHAR (Gael. *ceara*, blood-colored, from Gael., Ir. *cear*, blood). A name given to the numerous varieties of *Salvelinus alpinus*, a fish of the salmon family, and extended to several American 'trout.' The char has smaller scales than the true trout (Salmo), differs in the structure of the vomer, and has red instead of black spots, especially during the breeding season. The color is "grayish or green above, the lower parts red, especially in the male; lower fins anteriorly margined with white. Sides of body with round red spots; back not marbled." This species has a wide distribution, occurring in cold lakes and mountain streams of central and northern Europe, of northeastern America, and probably also in Siberia. It is extremely variable, and has, consequently, received a host of specific names, such as 'saibling,' 'sälbling,' 'ombre chevalier,' 'Greenland trout,' etc. The chars "are by far the most active and handsome of the trout, and live in the coldest, clearest, and most secluded waters" (Jordan and Evermann). They take preference over the trout as game fish. The best known of the distinctively American chars is the brook-trout, or speckled trout; but the trout of the Rangeley Lakes, in Maine, is somewhat nearer the European type. See Trout.

CHARACEÆ, kȧ-rā'sē-ē. See Charales.

CHARACTER (Lat., from Gk. *χαρακτήρ*, *charaktēr*, feature, graving-tool, from *χαρασσειν*, *charassein*, to engrave). A name given in ethics to the self-conscious nature of an agent. This nature manifests itself in, and as, the continuity of the various successive voluntary acts of the agent. Character has popularly been construed as a sort of causal substrate, underlying acts of conduct and giving rise to them. This popular conception has been responsible for the difficulties ordinarily thought to be involved in free will (q.v.). The conception of character not as a substrate, but as a continuity, of a man's voluntary acts, enables us to escape all these difficulties, and also keeps us in touch with the facts as they actually appear in experience. No one has ever known his own or his neighbor's character as a substrate. But what every one knows or can know is the general way in which he or his neighbor acts, and it is this general mode of conduct that constitutes character. The character may be vacillating or firm, noble or base; but whatever it be, it primarily is the way a man conducts himself, and it is only false metaphysics which turns a law of action into a substrate. See Substance; Ethics; Determinism.

CHARACTERISTIC. A term variously employed in mathematics, requiring specific definition in each case. The integral part of a logarithm is called its characteristic; thus, in log125 = 2.0969, log0.013 = $\overline{2}$.1139, log5 = 0.6990, the characteristics of the three logarithms are, respectively, 2, —2, and 0. The characteristic of the common logarithm of a number containing an integral part is one less than the number of integral places; that of a decimal is negative, and is one more, in actual value, than the number of ciphers preceding the first significant figure. On account of this simple relation, the characteristic is not ordinarily given in the tables of common logarithms.

In the method of characteristics due to Chasles (q.v.), which appeared in the *Comptes rendus* (1864), may be found the first trace of the 'numerative geometry,' the object being to determine how many geometric figures of given definition satisfy a certain number of conditions. A number which expresses how many simple singularities may replace a higher singularity of an algebraic curve or surface is called a characteristic number. The elementary right-angled triangle, whose hypotenuse is sensibly equal to the element of the arc of a curve, was called by Pascal the characteristic triangle. In the application of determinants (q.v.) to the solution of equations the minors of a certain order in the resultant may not all vanish, while all minors of higher order become zero, in which case the equations have a known number of solutions. The number expressing the highest order in which some minor does not vanish is called the characteristic of the determinant. In the theory of functions (q.v.), certain rational integral functions are called characteristic functions. In the theory of differential equations, there are certain algebraic equations every root of which determines an integral of the given differential equations. (See CALCULUS.) These are called characteristic equations.

CHARADE, shȧ-räd′ (Fr., Languedoc *charrade*, idle talk, probably from Sp. *charrada*, speech or action of a *charro*, clown). A form of amusement which consists in dividing a word of one or more syllables into its component syllables, or into its component letters, something predicated of each; and then, the whole being reunited, and something predicated of that also, the reader or listener is asked to guess the word. As a specimen of the charade depending upon syllables, we adduce the following:

"My *first* is plowed for various reasons, and grain is frequently buried in it to little purpose. My *second* is neither riches nor honors, yet the former would generally be given for it, and the latter are often tasteless without it. My *whole* applies equally to spring, summer, autumn, and winter; and both fish and flesh, praise and censure, mirth and melancholy, are the better for being in it. Answer: *Sea-son.*"

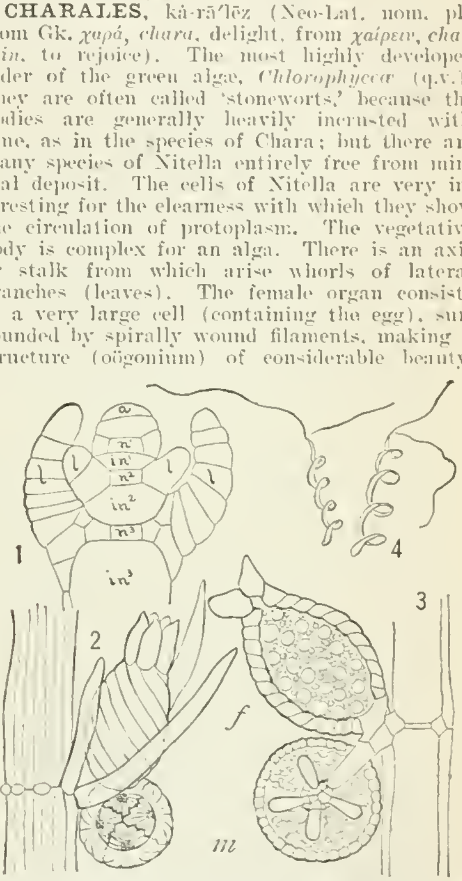
As a specimen of the second class of charades, we take the following example from the French:

"Quatre membres font tout mon bien,
Mon dernier vaut mon tout, et mon tout ne vaut rien."

The word is *zéro*. It is composed of four letters, of which the last (viz. *o*) is equal to *zero;* the whole, zero itself, being equal to nothing.

But, besides charades of this nature, there is another kind rather popular at evening parties—the *acted* charades—the character of which is entirely dramatic. Half a dozen or so of the company retire to a private apartment, and there agree to select a certain word as the subject of the charade. The next thing done is to take the first syllable, and arrange a little scene and dialogue, each member taking a certain part. This being accomplished, the amateur actors return to the drawing-room and commence their performance, the rest of the company constituting the spectators. Care is taken to mention conspicuously, and yet not obtrusively, in the course of the dialogue, the syllable which is the subject of the scene. On its conclusion they again retire and devise a new series of incidents for the next syllable, and so on. Finally they retire to contrive the final scene, into which the whole word must be dexterously introduced at an odd moment, when the spectators are thought to be off the scent. The company are then asked to guess the word. For the effective performance of a charade of this sort, the actors must possess a good share of inventiveness, self-possession, and ready talk, as the greater portion of the dialogue has to be extemporized.

CHARALES, kȧ-rā′lēz (Neo-Lat. nom. pl., from Gk. χαρά, *chara*, delight, from χαίρειν, *chairein*, to rejoice). The most highly developed order of the green algæ, *Chlorophyceæ* (q.v.). They are often called 'stoneworts,' because the bodies are generally heavily incrusted with lime, as in the species of Chara; but there are many species of Nitella entirely free from mineral deposit. The cells of Nitella are very interesting for the clearness with which they show the circulation of protoplasm. The vegetative body is complex for an alga. There is an axis or stalk from which arise whorls of lateral branches (leaves). The female organ consists of a very large cell (containing the egg), surrounded by spirally wound filaments, making a structure (oögonium) of considerable beauty.



CHARALES: *1*, apex, showing apical cell (*a*), the succession of nodal (*n*) and internodal (*in*) cells, and the young leaves (*l*); *2*, oögonium (above) and antheridium; *3*, the same enlarged and showing connections; *4*, sperms.

The male organ (antheridium) is a spherical, multicellular body situated near the oögonium. In the interior are numerous filaments divided by partitions into disk-like cells, each of which produces a sperm. An antheridium may develop from 20,000 to 40,000 sperms, which escape into the water and swim to the oögonium. The North American genera and species of Charales have been described by Allen, *The Characeæ of North America* (New York, 1888); Braun, *Fragmente einer Monographie der Characeen*, edited by Nordstedt (Berlin, 1882); Filarsky, *Die Characeen* (Budapest, 1893).

CHARALOIS, shȧ′rȧ′lwä′. In Massinger and Field's *Fatal Dowry*, the son of the Marshal of Burgundy. By his own imprisonment he redeems the body of his father, who had died in prison, and whose corpse had been seized for debt.

CHARBON, shär'bŏn. See Anthrax.

CHARBON ROUGE, shär'bôɴ' rōōzh' (Fr.), or Red Charcoal. A variety of charcoal obtained by subjecting wood to the action of heated air from furnaces, or of steam, which has been raised to a temperature of 572° F. Air-dried wood, by the ordinary process of charring, yields at the best 21 to 26 per cent. of black charcoal; but when acted on by heated air or steam, as mentioned above, 36 or 42 per cent. of charbon rouge is obtained. It is used in the manufacture of gunpowder. It has a dark-red color, and consists of about 75 per cent. pure carbon and 25 per cent. hydrogen and oxygen.

CHAR'CAS. See Chuquisaca.

CHARCOAL (probably from ME. *charken*, to crackle, AS. *cearcian*, to creak, variant of *cracian*, to crack + *cole*, coal; less plausibly from *char*, turn, from AS. *cerr*, Ger. *Kehr*, turn + *cole*, coal). A black, porous substance burning without smoke or flame, and formed by the imperfect combustion of organic matter, either animal or vegetable. *Animal charcoal* is produced by calcining the bones and ivory of animals in closed retorts. In this process the charcoal proper, which consists of the earthy and saline portions of the bone, combined with carbon, is left in the retort, while the volatile matter is allowed to escape into another compartment, where it is distilled. The escaping gas contains, among its other components, an oil which, when burned in closed chambers, deposits a soot which is known as *bone-black* or *ivory-black* pigment. (See Lampblack.) Animal charcoal, or bone-black, is itself a most useful material in the arts, on account of its power of absorbing coloring matter and odors. It is the best material known for filtering saccharine solutions (see Sugar), and various processes have been invented for recalcining bone-black after it has been used until no longer effective.

Wood-charcoal may be produced either in temporary furnaces formed by simply covering piles of wood with earth or sand, or in permanent furnaces specially designed for the purpose. If the former method is employed the wood is fired usually at the top, a central space being left from bottom to top for the progress of the fire. The gases are allowed to escape through holes left in the top. This method is much less frequently employed than formerly, as it not only produces an inferior grade of charcoal for manufacturing purposes, though not for fuel, but also involves the loss of the by-products, which escape in the gases and are lost. A charcoal-furnace is usually a dome-shaped structure with openings at the top and side for putting in the wood and a pipe or tube near the top for the escape of the volatile products. The wood rests on grates, and the quantity of air is regulated by a closely fitting ash-pit door. The wood is fired at the bottom, and when the process of combustion has sufficiently advanced, the ash-pit door is closed. The wood is now slowly carbonized, and the gaseous products escape into another chamber, where they are treated as described under Lampblack.

Wood-charcoal has many uses. It is valuable as a fuel, a polish, a filter, an absorbent of gases and aqueous vapors. As it is a non-conductor of heat, it is used as a packing for ice-chests; it is essential in various kinds of electrical apparatus, and is an ingredient in gunpowder and fireworks.

CHARCOAL BLACKS. Pigments prepared both from animal and vegetable substances—e.g. burnt ivory, bones, vine-twigs, peach-stones, nut and other shells, the smoke of resin condensed, etc. See Charcoal.

CHARCOT, shär'kō', Jean Martin (1825-93). A French neurologist, born in Paris. He received his degree of M.D. in 1853, and in 1856 was appointed physician to the Central Bureau of Hospitals. In 1873 he was elected a member of the Academy of Medicine, in the section of pathological anatomy, and in the same year became professor of pathological anatomy in the Faculty of Medicine in Paris, a position which he exchanged in 1882 for the professorship of diseases of the nervous system. He was widely known through his lectures delivered at the Salpêtrière Hospital. His various works are entitled: *De l'expectation en médecine* (1857); *De la pneumonie chronique* (1860); *La médecine empirique et la médecine scientifique* (1867); *Leçons cliniques sur les maladies des vieillards* (1868); *Leçons sur les maladies du système nerveux* (1873); *Leçons sur les maladies du foie, des voies biliaires et des reins* (1877); *Localisations dans les maladies du cerveau et de la moelle épinière* (1876-80); *Leçons sur les maladies du système nerveux faites à la Salpêtrière* (1880). Charcot also annotated the French translation of Baring Garrod's *Treatise on Gout*. He was one of the editors of the *Archives de physiologie*. His extensive researches on the value of hypnotic suggestion, in the treatment of hysteria and other morbid conditions, formed important contributions to our knowledge of nervous diseases and their therapeutics, and won for Charcot a wide reputation among the laity as well as in the medical world.

CHARD, Swiss Chard, or Sea-Kale. A form of the common garden beet (q.v.), in which the edible portion is the enlarged fleshy stalk and midrib of the leaves. Unlike garden beets, the roots are small and woody. Chard is used as a pot vegetable for greens and salad. It is grown, in the same manner as garden beets, by planting in early spring in rows 16 to 20 inches apart, and thinning to stand 14 to 16 inches distant in the row. The stalks and leaves are ready for use toward the close of summer.

CHARDIN, shär'däɴ', Jean (Sir John) (1643-1713). A French-English traveler, born in Paris. In 1664-69, and again in 1671-75, he made extensive journeys to Persia and India, where he had many adventures and acquired much wealth by trade in jewels. Because of the persecution of the Protestants in France, he settled in London in 1681, was knighted by Charles II., and was often referred to as 'the flower of merchants.' He was for some years English Envoy to the Netherlands, and devoted his later years to Oriental studies. In 1686 he published a portion of the *Travels of Sir John Chardin into Persia and the East Indies*. A reprint of the French edition of the complete work appeared in Paris in 1811. He gives a graphic and faithful account of what he saw and heard, and the part dealing with Persia, at whose capital he lived for many years, is of especial value.

CHARDON, shär'dôn. A village and county-seat of Geauga County, Ohio, about 30 miles east by north of Cleveland, on the Pittsburg and Western and the Cleveland and Eastern Suburban railroads (Map: Ohio, H 2). It is the centre of an agricultural region. Population, in 1890, 1084; in 1900, 1360.

CHARENTE, shä'räNt' (connected with OIr., Welsh, Corn., Bret. *car*, friend, Gall. *Carentus*, Brit. *Carantinus*, Lat. *carus*, dear). A river in the west of France, rising in the Department of Haute-Vienne, about 14 miles northwest of Châlus (Map: France, F 6). It first flows northwest to Civray, where it turns southward into the Department of Charente to Angoulême; thence it flows westward past Châteauneuf, Jarnac, and Cognac, and, entering Charente-Inférieure, runs northwest past Saintes, and falls into the Atlantic below Rochefort, opposite the islands Oléron and Aix. This river gives its name to two departments, remarkable for the productiveness of their vineyards. Length, 224 miles. The tide is felt as high as Saintes, and the river is navigable to Angoulême, 104 miles.

CHARENTE. A southwestern department of France, named after the Charente River, and formed chiefly out of the old Province of Angoumois (Map: France, G 6). Area, 2294 square miles. Population, in 1896, 352,829; in 1901, 350,305. Capital, Angoulême.

CHARENTE-INFÉRIEURE, shä'räN'tăN'-fā'rē-ēr'. A western maritime department of France, including part of the former Province of Angoumois, with the greater part of Saintonge and a small portion of Poitou (Map: France, F 6). Area, 2635 square miles. Population, in 1896, 450,014; in 1901, 452,149. It is watered on its boundaries by the Sèvre-Niortaise and the Gironde, and in the centre by the navigable Charente and the coast stream Sendre. The surface is level; the soil produces hemp, flax, saffron, and wine in great quantities. The oyster and pilchard fisheries are important. The chief harbors are those of Rochefort and La Rochelle; the latter town is the capital of the department.

CHARENTON, shä'räN'tôN' (connected with Gall. *Carentus*, Lat. *carus*, dear). A town of France, in the Department of Seine, situated on the right bank of the Marne, 5 miles southeast of Paris (Map: France, C 7). The bridge over the river, which is important from a military point of view, being considered one of the keys of the capital, and which has frequently been the scene of conflicts, is defended by two forts, forming a part of the fortifications of Paris. At the other side of the river is the national lunatic asylum, formerly called Charenton Saint Maurice and now Saint Maurice simply. The industries of Charenton are piano-making and the manufacture of porcelain and india-rubber goods. Population, in 1901, of town, 17,758; of commune, 17,980.

CHARENTON-LE-PONT, -le-pôN'. See CHARENTON.

CHARES, kā'rēz (Lat., from Gk. Χάρης) (?-c.324 B.C.). An Athenian general, the son of Theochares. He was appointed general in B.C. 367, and in the same year relieved the Phliasians, who were besieged by the Argives and Sicyonians. When Oropus was taken, he was recalled from the Peloponnesus; but soon after, the Athenians and Arcadians, having entered into an alliance, returned and made an unsuccessful attempt to seize Corinth. In B.C. 361 he was sent to Corcyra, where, through his uncompromising bearing, he destroyed the Athenian influence. In B.C. 358 or 357 he was in the Chersonese, whither he had been sent to demand the withdrawal of Cersobleptes. When the Social War broke out and Chios revolted from Athens, Chares and Chabrias led an attack on the island and town, the former at the head of a land force, the latter with a fleet. The attack proved unsuccessful, Chabrias being killed and Chares forced to retire. In B.C. 356, being sent, in joint command with Iphicrates, Menestheus, and Timotheus, to relieve Samos, he fought alone at Embatta, against the judgment of the other commanders, and was defeated. At the trial of accountability, Chares appeared as the formal accuser of his colleagues, who were convicted and deposed. Chares was now put in sole command, and, in order to secure funds for his troops, he, in B.C. 355, joined the rebellious satrap Artabazus, and gained a brilliant victory over the King's forces. Much booty was obtained, and Chares was rewarded by the Athenians with a golden crown. In B.C. 353 he recaptured Sestos, which had revolted from Athens during the Social War, and in B.C. 349 he was sent to the aid of Olynthus, with what result we do not know. In B.C. 338 he fought, as one of the Athenian generals, at Chæronea. After the seizure of Thebes, his surrender being demanded by Alexander, he withdrew from Athens, but appeared again in B.C. 332 at Mitylene, at the head of 2000 Persians. At the approach of the Macedonian fleet he surrendered the town on condition that the troops be allowed to depart in safety. His death took place before the year B.C. 324.

CHARES (Gk. Χάρης). A Grecian worker in bronze, a native of Lindus, and the designer of the Colossus of Rhodes. He lived in the Third Century B.C., and was a pupil of Lysippus.

CHARETTE DE LA CONTRIE, shä'rĕt' de lä kôN'trē', FRANÇOIS ATHANASE (1763-96). A French royalist, born at Couffé, Loire-Inférieure. In 1793 he became the head of the royalist bands of Lower Poitou, and finally gained control of all of Lower Vendée. His gallant exploits made him dreaded by the Republicans. He entered into a treaty with the Convention on February 15, 1795, which, however, did not end the war. After several leaders of the Vendéeans had been executed by General Hoche, Charette de la Contrie resumed operations. He was defeated at Saint-Cyr and then confined himself to guerrilla warfare. He was severely wounded in one of his encounters with the Republican troops, and was captured, March 29, 1796, and shot at Nantes.

CHARGE (from OF., Fr. *charger*, It. *caricare*, to load, from Med. Lat. *carricare*, to load a car, from Lat. *carrus*, car, from Gall. *carros*, OIr., Welsh, OBret. *carr*, car). The quantity of gunpowder or other explosive used in loading a gun, torpedo, or projectile. The *full* or *service charge* of gunpowder is the amount with which a gun is designed to give its maximum velocity in service. *Reduced charges* are used for target practice or for high-angle fire when it is desired to fire over an intervening obstacle and have the shell fall behind it. The charge for a projectile is called the *bursting charge*. See BALLISTICS and GUNNERY.

CHARGE, in military tactics. See ATTACK; BATTLE; TACTICS. For heraldic charges, see HERALDRY.

CHARGE AND SPECIFICATION. The formal written statement before a general court-martial of the offense alleged to have been committed by the accused. In the United States service a military charge consists of two parts—the technical *charge* designating the general character of the offense and the *specification* giving the statement of the offense in detail. The article of war under which the offense comes is mentioned in the charge. See COURTS, MILITARY.

CHARGE OF THE LIGHT BRIGADE, THE. A poem by Alfred, Lord Tennyson, written in commemoration of the famous episode at the battle of Balaklava (October 25, 1854), and published in quarto (London, 1855). An altered version appeared under the title of *In Honorem* (1856, octavo). In the second edition, the line "some one had blundered," which had been erased from the original draft, was restored. The metre is that of Drayton's "Battle of Agincourt."

CHARGER. See HORSE, for a discussion of the military uses of the horse.

CHARGÉ D'AFFAIRES, shär'zhâ' dȧ'fâr' (Fr., charged with affairs). A diplomatic agent, ranking fourth, after ambassadors, ministers, and resident ministers. He is accredited not to the sovereign, but to the State department of a foreign power, and he holds his credentials only from the minister. Sometimes, however, he may be empowered by an ambassador to act in his absence.

CHARICLEA, kăr'ĭ-klē'ȧ. Daughter of Persina, the Queen of Æthiopia, and heroine of the story, in a Fourth Century novel by Heliodorus, entitled *Theagenes and Chariclea.*

CHARING (châr'ĭng) **CROSS.** A district on the northwest bank of the Thames between the Strand and Whitehall, adjacent to a great cross, which is one and a quarter miles from Saint Paul's, and is at present contained within the yards of the Southeastern Railway Company. The district stands upon the old site of the Thirteenth Century village of Cherringe, where, in 1291, a Gothic cross was erected by Edward I. as a token that the bier of his beloved wife, Eleanor, had been set down there during its journey from Grantham, Lincolnshire, to Westminster Abbey. In 1647 the cross was demolished by the Parliamentary Party as a relic of Popish superstition. The present copy was erected near the original site in 1865. The site itself, as near as it can be guessed, is now occupied by Le Sueur's equestrian statue of Charles I., which was cast in 1633 and erected in 1674.

CHARIOT (OF. *chariot*, dim. of *char*, car). In ancient times, a kind of carriage used either for pleasure or in war. The use of the chariot in war and peace was general in the East, and it is common on Egyptian, Babylonian, and Assyrian monuments. It was early introduced among the Greeks, and is represented on Mycenæan works of art. In the Homeric poems the chariot is employed to convey the heroes to the field of battle, though they usually fight on foot, and also on journeys. In historical times the war chariot was not used by Greeks or Romans, though still a part of the Persian armies. Cæsar also found chariots in use among the Britons, and they are frequently mentioned in the Irish epics. The ancient chariot was a light two-wheeled car, usually with a closed front and sides, but open behind. In the earliest times the chariot was drawn by two horses, yoked to a pole, and this type was not uncommon later. (See BIGA.) The racing chariot was the *quadriga*, and was drawn by four horses, harnessed abreast. The centre pair were attached to the yoke, the outer were attached to the chariot by traces. The *quadriga* used in the Roman triumph was often elaborately adorned. The war chariot used by the Britons, Persians, and other peoples were often armed with scythes attached to the axles. For abundant illustrations of the ancient chariot in its many forms, see Daremberg and Saglio, *Dictionnaire des antiquités*, s. v. *Currus*. See CARRIAGE.

CHARIS, kā'ris. In Homer's *Iliad*, the wife of Hephæstus, and the personification of grace, amplified into the Three Charities (q.v.).

CHARISIUS, kȧ-rĭsh'ĭ-ŭs, FLAVIUS SOSIPATER. A Roman grammarian of the Fourth Century A.D. Nothing is known of his personality, and only a portion of the first five books of his Grammar—*Ars Grammatica*—is preserved. It is largely a work of compilation, but is valuable to us for its many quotations from early authors. The text will be found in Volume I. of Keil, *Grammatici Latini* (Leipzig, 1857).

CHARISTICARIES, kăr-ĭs'tĭ-kā'rĭz (Med. Lat. *charisticarius*, from Gk. *χαριστικός*, *charistikos*, generous, from *χαρά*, *chara*, favor, from *χαίρειν*, *chairein*, to rejoice). In Greek ecclesiastical history, officers who had full power over the revenues of hospitals and monasteries.

CHARITABLE TRUSTS, or **CHARITIES.** Property, real or personal, vested in trustees to be administered by them for religious, eleemosynary, educational, or other benevolent purposes of a public nature. The origin and use of the term is due to the difficulty, more apparent than real, experienced by the English Court of Chancery in enforcing trusts created for the benefit of a class of indefinite and unascertainable beneficiaries, as a trust for the benefit of the insane, generally, or for the benefit of the poor of London. Inasmuch as there was no ascertained person having the right to invoke the jurisdiction of the court to compel the trustee to perform the duty imposed on him, such a trust was deemed in many instances to be unenforceable and void. To avoid this consequence when the attempted trust was of a salutary character, an early English statute, known as the Statute of Charitable Uses (43 Eliz. cap. 4, 1601), was passed, declaring such trusts valid and enforceable by commissioners appointed by the Court of Chancery. Such trusts have since been known as charitable uses, or charitable trusts. It is probable that the administration of such trusts fell to some extent within the prerogative jurisdiction of the Chancellor before the statute, and its principal effect was to enlarge the jurisdiction of the Court of Chancery and to define the uses which were to be recognized as charitable, as distinguished from those which, after the Reformation, were deemed superstitious and void as pertaining to the Catholic Church.

The charitable trust is distinguished from the private trust, which includes all other trusts, in that (1) it always exists for charity or public beneficence; (2) its beneficiaries are indefinite and undetermined; and (3) it may and usually does create a perpetuity.

I. An enumeration of the charitable objects, for which such trusts may be created and upheld, is found in the statute of Elizabeth. Those objects may be grouped, as appears by the definition given, under four general heads, as follows: (1) Gifts for *strictly eleemosynary* objects, i.e. for charity in its narrow, popular sense, such as gifts for the poor, for sick, disabled, or demented persons, and for hospitals, homes, and asylums. (2) Gifts for *educational purposes*, as for schools and colleges, to build or equip libraries, and to endow scholarships, fellowships, and the like. (3) Gifts for the purposes of *religion*, such as those for the building or repairing of churches, for missions, and for spreading the Gospel. (4) Gifts for *lightening the expenses of government*, such as bequests for the erection of public buildings, docks, wharves, canals, etc.

II. *Indefiniteness in the beneficiaries*, either as to the class to be benefited, or as to the individuals in a determined class who will be the objects of the bounty, is the predominant distinguishing feature of charitable uses or trusts. If the beneficiaries be definitely specified, no matter how charitable the object of the gift, it constitutes a private trust and is valid without the aid of the statute, and must be construed and governed accordingly. Thus, a trust for the support and comfort of designated persons in a certain hospital would be private, while a trust for all those who should be cared for by such an institution would be public, or charitable. This feature of trusts for charity, coupled with the liberal spirit in which courts construe such gifts, has led to the method of executing them, called *cy pres* ('as near as'). By this doctrine is meant, that when such gifts cannot be applied according to the precise intention of the donor, although the general purpose of the trust is proper, they will be employed for the purpose in a manner as near as possible (*cy pres*) to that which was designated. It assumed two forms in England. In one form it was employed by the Chancellor in the exercise of a prerogative, executive power, delegated to him under the sign manual of the Crown, and was carried to the extent of applying a trust for charities to *some* charitable purpose, even when the particular objects for which it was intended were illegal and void. In its other form, it was exercised by the Chancellor in the performance of his *judicial* functions, and was applied only to such charitable trusts as were legal and valid in their inception, but which, because of some change in law or circumstances, could not be carried out in exactly the manner indicated by the donor. In this latter form, but not in the former, the *cy pres* doctrine is recognized and applied in some, though not in all, of the American States, where trusts for charity are allowed. For example, a bequest made before the fall of slavery in the United States, to trustees, to be applied to various methods of creating a sentiment against negro slavery in America, was applied, after the close of the Civil War, by the Massachusetts courts, to the American Freedmen's Union Commission; and in Missouri, trustees having been directed by will to establish *forever* a charitable home upon land devised to them, and a portion of the land having been cut off from the residue by a new street and rendered useless for the building, that portion was ordered by the court to be sold and the proceeds applied to the payment of the debts of the same institution.

III. A trust necessarily suspends, during its continuance, the power of free and unrestrained alienation of property. It is, therefore, restricted by the common-law principle and prevalent statutory provisions, which forbid such suspension except for a limited time measured by the lives of one or more individuals. A suspension beyond such a period is known as a *perpetuity* (q.v.) and is invalid. But property donated to trustees for charitable purposes may remain in the hands of such trustees for all time, notwithstanding the fact that the absolute power of alienation is thus indefinitely suspended. Similarly a provision for accumulation (q.v.), void under the same rule in case of a private trust, does not impair a charitable trust.

Gifts for charitable uses are of considerable antiquity. They were known and fostered by the Christian emperors of Rome as 'pious uses,' and it was in this form and under this description that the doctrine passed from the civil law into the law of England, where, as has been said above, pious or charitable uses were enforced to some extent by the Chancellor long before the statutes of 39 and 43 Elizabeth.

In England the system of charitable trusts and the method of administering them is now based upon a series of modern statutes of the most enlightened character, known as the Charitable Trusts Acts, passed in 1853, 1855, 1860, 1869, and 1888, and, lastly, upon the Mortmain and Charitable Uses Act, passed in 1891. In the United States the statutes of Elizabeth have not generally been enacted, but in most of the States the principle embodied in those acts and enforced by the English Court of Chancery has been judicially recognized as a part of the body of legal principles brought over from the mother country, and many trusts not strictly within the English statute are here held to be valid by analogy. New York, long a conspicuous exception, has recently by statute made possible the creation of trusts for charitable purposes, but there are still several States in which no distinction is made between charitable trusts and trusts for private purposes.

BIBLIOGRAPHY. The literature of the subject is extensive. Among the most important works dealing exclusively with it are Shelford, *Treatise on the Law of Mortmain, and Charitable Uses and Trusts* (London, 1836); Tudor, *Law of Charities and Mortmain* (London, 1890). Consult, also, the general treatises on trust and equity jurisdiction, as Perry, *Treatise on the Law of Trusts and Trustees* (5th ed., Boston, 1899), and Pomeroy, *Treatise on Equity Jurisprudence, etc.* (San Francisco, 1892). See MORTMAIN; TRUST.

CHARITIES. In Greek mythology, the three goddesses of grace and charm, called Gratiæ by the Romans. They were the offspring of Zeus, and were named Euphrosyne (joy), Thalia (bloom), and Aglaia (brilliance). Their home was on Olympus, with the Muses. Their oldest shrine was at Orchomenus in Bœotia, where their festival, the Charitesia, was celebrated. In sculpture they usually appear as three beautiful maidens hand in hand.

CHARITIES. The public and private institutions of society whose object is the relief of those suffering from poverty, sickness, and all forms of human disease, provided such relief is given without compensation, and proceeds solely from the motive of human sympathy.

In ancient times few such institutions existed. The unfortunate individual who was unable to care for himself had to look to the immediate circle of his nearest of kin, or, more frequently, was allowed to perish, or actually put to death because he was regarded as a burden by the community which had to struggle for existence without being able to accumulate any social surplus of wealth. This is peculiarly the case in a nomadic society. The historical growth of the spirit of charity is briefly and admirably described in Lecky's *History of European Morals*.

The first efforts at institutional relief were those of the early Christian Church. They were carried out in response to the teaching of the Church that it is more blessed to give than to receive; that there is merit in the very act of giving, and that the future welfare of the giver is in a measure dependent on his generosity. Such a doctrine gave little thought to the effect of the gift on the recipient, or, indeed, to the welfare of the recipient after the gift was once bestowed. Naturally a reckless system of charity developed, which in some cases had to be suppressed, and in other cases where the Church, especially in Northern Europe during the Reformation period, lost most of its property and was unable to continue the support of large numbers of undeserving poor, something had to be done as a substitute by public authorities.

In this way a system of public charity grew up in England, though in the beginning it was a part of the criminal law, providing not measures of relief, but regulations and institutions for the repression of 'vagabonds' and 'sturdy beggars.'

The earliest and most popular really charitable institutions were hospitals. Private charities, supported entirely by voluntary contributions, had their beginning, usually, in institutions for the relief of foundlings and abandoned children. By the end of the Eighteenth Century in Europe many such institutions existed, and the public almshouse or workhouse, supported from public funds, had been established in most countries especially for the relief of the aged poor. At the beginning of the Nineteenth Century a great movement for the reform and extension of these institutions began. In America the almshouse was then practically the only public institution provided for the needy and helpless: although private societies for the relief of peculiar kinds of distress soon began to multiply.

A history of the philanthropy and charities of the Nineteenth Century, some volumes of which have already appeared, was prepared for the International Exposition in 1900, and has been classified as follows, the classification being a fairly comprehensive one of modern charities: (1) Institutional care of destitute adults; (2) Defectives, insane, feeble-minded, epileptic; (3) The treatment of criminals; (4) Hospitals, dispensaries, nursing; (5) Destitute, neglected and delinquent children; (6) Care and relief of needy families; (7) Supervisory and educational movements; (8) Preventive and constructive philanthropy. The public authorities have, in most modern countries, assumed responsibility for 1, 2, and 3; 4 and 5 are divided between public and private agencies; 6, 7, and 8 are still largely in private hands.

The line cannot be clearly drawn between public and private charities. Public charities are those supported entirely, or in part, from funds raised by taxation, while private charities are those supported by voluntary contributions, administered by societies especially organized for the purpose. Private charitable societies are frequently placed under some public supervision. A general principle giving the sphere of activity of public and private charities has been stated as follows: Public charities should provide for those well-defined and more or less permanent needs of the community for the relief of which experience has been sufficient to enable us to formulate very definite rules and regulations which can be carried out more or less mechanically by public officials who must interpret laws more often literally than in the spirit in which they were framed, while private charities should deal with those forms of relief still in the experimental stage, with a view of demonstrating what can be done by the public authorities on a larger scale.

Private philanthropy centres about the home and the family. It views the home as the important element which must be protected and preserved. Public charity has followed private initiative, gradually taking up those institutions shown to be necessary. To protect the home, the tenements are brought under regulation. (See HOUSING PROBLEM.) To enable the bread-winner to support the family, dangerous employments are regulated. (See FACTORY INSPECTION.) Sanatoria are built for consumptives. Children are properly cared for. (See DEPENDENT CHILDREN; JUVENILE OFFENDERS; CRUELTY TO CHILDREN, PREVENTION OF.) Foundling hospitals and children's aid societies rescue the abandoned. It is sought to get at the causes of distress and to remove them rather than to minimize results of bad conditions. (See PAUPERISM; CHARITY ORGANIZATION SOCIETY; SOCIAL SETTLEMENTS.) Visiting nurses attend the sick poor, and diet kitchens furnish suitable food. Playgrounds are established for the children. Wherever a need is manifest, some attempt is made to supply it. Charity is becoming less sentimental and more methodical and scientific. Its administrators are trained experts. All civilized nations are pursuing similar courses, and while many problems are not yet solved, great progress is being made. See, also, POOR LAWS; SOCIAL DEBTOR CLASSES.

CHARITIES AND CORRECTION, THE NATIONAL CONFERENCE OF. An association of some 1400 members in the United States, Canada, and Mexico, who are interested in philanthropic efforts. Many of the members are actively connected with charitable activities in various cities. There are no tests of membership. All shades of thought are represented. The conference has no platform and adopts, usually, only resolutions of thanks. All persons are privileged to participate in the discussions. It is simply an exchange for the comparison of views and experiences, not a body organized to accomplish any undertaking. One result of its deliberations was to arouse public interest leading to the establishment of local or State conferences, and in securing needed legislation.

The first session was held in New York City in 1874 at the invitation of the Social Science Association, with which body joint meetings were held till 1878, though the proceedings were published separately after 1876. In 1879 the first separate convention met in Chicago, with delegates from twelve States. The membership and attendance have steadily increased. The State Governors frequently appoint representatives, as do the mayors of large cities. Delegates from foreign lands are often present. In 1880 the first report on the organization of charity was read, and thenceforth this topic has had great attention. In 1893 a membership fee was charged, the expense previously having been met by contributions. The membership fee is $2.50, entitling the members to the volume of *Proceedings* and the quarterly *Bulletin*. These volumes contain a vast amount of valuable information on the charitable activities of America. The conference holds annual meetings in May in the various cities of the country. The evening sessions are devoted to general questions. Section meetings are held during the day. These sections are in charge of special committees, composed of experts in the various fields. The general secretary is Joseph P. Byers, Columbus, Ohio. Consult *Proceedings of the National Conference of Charities and Correction* (Boston, 1874, et seq.).

CHARITON, chăr'ĭ-ton. A city and county-seat of Lucas County, Iowa, 56 miles south by east of Des Moines, on the Chariton River, and on the Chicago, Burlington and Quincy Railroad (Map: Iowa, D 3). The city contains a public library, established in 1898, and has manufactures of foundry and machine-shop products, agricultural implements and machines, bricks, flour, carriages, and wagons, windmills, tanks, pumps, pipe, etc. There is a municipal electric light plant. Population, in 1890, 3122; in 1900, 3989.

CHARITON, kăr'ĭ-tŏn (Gk. Χαρίτων). A Greek prose writer, the author of a romance entitled *Chæreas and Callirhoë* (q.v.), written not earlier than the Fifth Century A.D. Of the author's birthplace and personal history we know nothing; for the statement at the beginning and end of the work that the writer was a native of Aphrodisias in Caria has long been recognized as a pure invention. Consult Rohde, *Der griechische Roman und seine Vorläufer* (Leipzig, 1898).

CHARITY, BROTHERS AND SISTERS OF. See BROTHERS AND SISTERS OF CHARITY.

CHARITY ORGANIZATION SOCIETY. Associations bearing this name or known as Associated Charities, United Charities, or Bureau of Charities existed in 1901 in 134 cities of the United States, with 17 other societies partially adopting their methods, and in 7 Canadian cities. They are also found in the English and Australian cities and organizations more or less closely resembling them exist in Europe. The parent society, known as The Society for Organizing Charity and Suppressing Mendicity, was started in London in 1869 and was supported by such men as Gladstone, Ruskin, and Cardinal Manning. The first Charity Organization Society in America was organized in Buffalo, N. Y., in 1877, through the influence of Rev. S. H. Gurteen, who was acquainted with the work of the London society. The Charity Organization Society has already become one of the most successful of charitable undertakings and wields great influence. The founders of the London society said that its main object was "the cure as distinguished from the mere alleviation of distress." Another object was to bring about such a coöperation between existing charities as to avoid overlapping of fields and duplication of efforts. To many of the earlier societies the reason for existence was almsgiving to those in distress, little, if any, careful investigation being made as to the cause of the trouble and less attention being paid to the work of other agencies. Whenever such a condition obtains it is always found that many people are practically supported in idleness; that 'charity tramps' and professional beggars abound. The very existence of these various dissociated agencies is a temptation to those on the border line of self-support to seek assistance. As one person says: "We have no right to make our alms a temptation to the poor; and it is a dangerous, though easy, thing to teach a man that he can live without work." The charity organization societies, therefore, stand for certain general principles.

COÖPERATION. They act as a clearing house for all philanthropic societies and individuals. Careful records are kept of all cases. These are preserved in envelopes—one for each family. In these envelopes are put all the information regarding the individual and family history; the reports of investigations; all letters and other relevant matter. The record is kept as nearly up to date as possible. These envelopes are so filed that they can be found in a moment. The records are confidential and are given only to persons or societies having a legitimate interest in the family. Their use prevents duplication and fraud. Public officials frequently find them of great assistance. The society undertakes to know just what the other organizations do. As they seek to cure distress, not merely to relieve it, whenever a case comes under their care a careful investigation is made of the family's condition, sources of income, possible means of assistance, friends, former employers, etc. In cases of emergency assistance is at once given or secured. Then some plan is formed—comprehensive, but subject to constant modification—and this plan is followed until, if possible, the family becomes self-supporting, or, if this is impossible, until some permanent disposition may be made so that the family may have no excuse for asking further assistance. This often involves the calling upon a number of institutions for their services. There is, however, a clearly defined end in view so that the organizations assisting are rendering a most valuable coöperation. The Charity Organization Society does not duplicate existing agencies, but seeks to supplement them. Many consider this the most important feature of their work. Some charity organization societies have even had no relief fund, preferring to act wholly as mediators.

PERSONAL SERVICE. The pursuit of a comprehensive plan involves an immense amount of time and labor. Under the old system a sum of money or other necessaries were given and the recipient disappeared from sight and notice till trouble brought him back. The Charity Organization Society seeks to show a personal, friendly interest in the family. To further this aim, a corps of 'friendly visitors' is developed—cultivated, intelligent men and women—who undertake to visit a family regularly, to share sympathetically in its troubles and its pleasures. The power of this personal interest of a tactful and resourceful person on the family life is hard to estimate. These friendly visitors are always unpaid, and thus their interest is wholly unselfish. The way is opened for all sorts of suggestions for improvement, for making the home attractive to the children and father. The friendly visitors hold regular conferences.

Social Service. Growing out of the intimate knowledge gained by frequent personal visits comes the opportunity to influence the community regarding the necessity for playgrounds, better sanitary and housing conditions, factory legislation, and the like. Such service is of the highest value, often accomplishing great reforms. The present movement to reform the tenements in New York City is largely the result of the labors of the Charity Organization Society and interested individuals. Here should be noted the possibility of handling special relief funds in times of emergency. The Charity Organization Society, with its trained force and intimate knowledge of local conditions, can act to great advantage. Mention should be made of the influence exerted to cut down unwise appropriations for supposed charitable purposes. Another valuable service is the investigation of charitable organizations for the information of intending donors. By no means the least valuable part of this social work is in getting so many people directly interested in the work of the society.

Self-Help. The object of the Charity Organization Society is to 'help to self-help.' It is not sought to give something for nothing. The self-respect and the independence of the individual is always to be preserved. Work rather than alms is given. Laundries, sewing-rooms, woodyards, employment bureaus, are maintained according to local needs. In some cities the vacant lots and waste places have been transformed into vegetable gardens, carried on, under expert guidance, by the poor. When necessary the professional beggars are prosecuted; lists of unworthy alms-seekers are published, to compel them to seek honest employment.

Preventive Work. The head of the family is dealt with whenever possible. The children who ask for assistance on behalf of parents are told that the parents must come in person. The child must not form the begging habit. All workers will testify to the value of preventive efforts on behalf of the children. Summer camps, home libraries, local associations, mothers' meetings, penny savings banks, are among the forms this work assumes. This great power of adapting the work to local needs and conditions is of the utmost importance.

It will be seen from the foregoing that the work of the Charity Organization Society is to an unusual degree administrative—personal. This is the secret of the great work it is able to do, but is frequently a cause of complaint to those who do not grasp the situation. Personal service is considered the highest form of giving. A large part of the income of the Charity Organization Society is therefore spent in salaries. The complexity of the organization naturally increases with the size of the city. There is a board of directors chosen from among those who contribute to the society, and under the directors an executive committee. The administrative officer is the superintendent, who has his necessary assistants. The larger cities are divided into districts, each in charge of a district superintendent, who is responsible for the work in the district. Applicants for help are referred to the district in which they live. The central and district offices are open daily. The central office keeps on file a digest of all cases from each district. In each district a 'decisions committee' meets weekly to discuss the various cases and decide upon courses of action. The funds come from private donors.

Expert Service. The work of the Charity Organization Society calls for educated and trained men and women. The mere desire to do good is no qualification, nor is charitable work in general any longer a dumping-ground for those who have failed in other professions. The highest abilities are sought, and some societies are conducting special schools for portions of the year for the training of workers. The administration of charity has become a profession.

Publications. The best periodical in America devoted to the charitable field is *Charities*, published by the Charity Organization Society of New York City. In England this place is filled by the *Charity Organization Review* of the London Society. Consult: Warner, *American Charities* (New York, 1894); Devine, *The Practice of Charity* (New York, 1901); Richmond, *Friendly Visiting* (New York, 1900); Loch, *Charity Organization* (London, 1892); *Reports of Societies* (Boston, New York, Philadelphia, Chicago, etc.). See Pauperism; Social Debtor Classes.

CHARIVARI, shä'rē'vä'rē' (Low Lat. *charivarium*). A French term used to designate a wild tumult and uproar, produced by the beating of pans, kettles, and dishes, mingled with whistling, bawling, groans, and hisses, and got up for the purpose of expressing a general dislike to the person against whom it is directed. The etymology of *charivari* is obscure; the Germans translate it by *Katzenmusik*, the English of which is *caterwauling*. In France, during the Middle Ages, a charivari was generally raised against persons contracting second nuptials, in which case the widow was especially assailed. On these occasions the participators in it, who were masked, accompanied their hubbub by the singing of satirical and indecent verses, and would not cease till the wedding couple had purchased their peace by ransom. Charivari answers to the English concert upon 'marrow-bones and cleavers,' with which it was customary to attack a married couple who lived in notorious discord. It was also organized against an unequal match —e.g. where there was great disparity in age. In some of the rural districts of the United States a like custom prevails, the instruments of discord being horns, tin pans, horse-fiddles, and whistles. The rustic American corruption of the word 'charivari' is 'shiveree,' for which a synonym is 'skimmerton.' Similar customs seem to have existed under different names in all parts of Europe, and sometimes they were of such a licentious and violent character as to require military interference to put them down. Even as early as the Fourteenth Century, the Church found itself forced to threaten punishment, and even excommunication, against those who participated in them. In more recent times the charivari has taken a purely political coloring: as, for example, during the Restoration in France, at which time, however, the popular voice began to seek vent by casting its satirical darts against public men through the press. Among the papers of this sort the most famous is the *Charivari*, which was established in Paris, December 2, 1832, corresponding to the English publication *Punch* (q.v.).

CHARKOV, kär'kôv. See KHARKOV.

CHARLEMAGNE, shär'le-mān. *Fr. pron.* shär'l'-mä'ny'. See CHARLES THE GREAT.

CHARLEMAGNE CYCLE OF ROMANCES. A division of one of the three principal cycles of romances which took form in France in the Thirteenth Century. These three cycles may roughly be designated as the *gestes royales*, the *gestes de Guillaume*, and the *gestes de Doon de Mayence*. The first of these divisions was composed of all the poems which had been written about the three regal historic figures Pepin, Charles, and Louis, and the *Charlemagne Cycle* was composed exclusively of all those poems which centred about the life and Court of the second of these characters. It consisted of a collection and arrangement made by certain itinerant musicians, who were editorially minded, of whatever of the ancient *chansons de geste* pertained particularly to the deeds of this one hero. Many of these chansons were founded on certain heroic ballads which Charlemagne himself had caused to be preserved in writing. These had already formed the basis of two Latin chronicle-histories by a monk of Saint Gall (890), and by Benedict of Saint-André (968), entitled, *De Gestis Caroli Magni;* and the two latter works were doubtless of great aid to the Thirteenth Century coditiers of the *gestes*. The cycle is composed of the following individual narrative poems: *Fierabras; Garin de Montglane; Gallien le Rhetoré; Ogier le Danois; Les Quatres Filz Aymon*, and others of varying dates. A prose version of it, in French, was printed at Bagnyon in 1478. Consult G. Paris, *Histoire poétique de Charlemagne* (Paris, 1865).

CHARLEROI, shär'l'rwä' (Fr., Charles king). A Belgian town and fortress in the Province of Hainault, situated on the Sambre and on the Charleroi Canal, between Mons and Namur. It is divided into the upper and lower town (Map: Belgium, C 4). It possesses an archæological museum, with a mineralogical collection and an industrial school, and is altogether dependent upon the activities of the surrounding region. The district is rich in coal and iron, the number of smelting furnaces and nail-factories in the neighborhood being very great. The iron-works of Couillet, which yield a third of all the cast iron produced in Belgium, are within a mile or two of the town. Population, in 1890, 21,900; in 1900, 24,800. In 1666 the village of Charnoi was fortified by the Spaniards, and named, in honor of the King, Charles II., Charleroi.

CHARLEROI, shär'le-roi'. A borough in Washington County, Pa., 40 miles south of Pittsburg, on the Monongahela River, and on the Pittsburg, Virginia and Charleston Railroad. It is an important manufacturing centre, with extensive glass-works of various kinds, and shovel-works. Charleroi was settled in 1890, and incorporated in the following year. The government is vested in a burgess, elected every three years, and a borough council, chosen on a general ticket. Population, in 1900, 5930.

CHARLES THE GREAT, or **CHARLEMAGNE** (from Lat. *Carolus Magnus*, Charles the Great) (742-814). King of the Franks after 768, and Roman Emperor from 800 to 814. He was the son of Pepin the Short, the first Carolingian King, and of Bertha, a daughter of Charibert, Count of Laon, and was born probably on April 2, 742. His birthplace is unknown; but from the fondness which he displayed throughout his life for the cities of Aix-la-Chapelle and Ingelheim, it has been conjectured that he was born in one of these places. Of his early youth and education nothing is known, even by Einhard, his contemporary biographer. He was brought up at the Court of his father, and received the thorough military training which constituted the education of the time. He took part in his father's expeditions against Aquitaine in 761 and 762. On Pepin's death, in 768, the Frankish kingdom was divided between his two sons, Charles receiving the eastern part or Austrasia, which was predominantly Germanic, together with a part of Aquitaine, while his brother Carloman received Neustria, the Romance part of the Frankish domains. Carloman died in 771, and Charles, with the consent of the Frankish nobles, took possession of the entire kingdom, to the exclusion of the young sons of his brother. Their mother fled to Desiderius, King of the Lombards, and the ensuing complications led to the first great war of Charles's reign. Charles had, ere this, in 770, offended Desiderius by repudiating his second wife, Desiderata, who was that monarch's daughter. The latter, therefore, received Carloman's widow hospitably, and urged Pope Adrian I. to crown the sons of Carloman. Upon the Pope's refusal, he invaded the Papal territory. The Pope thereupon summoned the Frankish King to his aid. Charles endeavored to avert the war; but upon the refusal of Desiderius to restore the Papal cities of the Pentapolis, he crossed the Alps, with two armies, from Geneva by the Great Saint Bernard and Mont Cenis, in 773, and besieged Desiderius in Pavia, forcing him, after a ten months' siege, to surrender and retire to a monastery. In 777 he proclaimed himself King of the Lombards, and was acknowledged as such by the Lombard dukes. He secured the Pope's favor by confirming the donation of lands made to the Holy See by Pepin. In the winter of 776 he again crossed the Alps and crushed a Lombard revolt, henceforth ruling over northern and central Italy as far south as Spoleto. In 780 he went to Italy, where the Pope crowned his second son, Pepin, King of Italy, and his third son, Louis, an infant, three years old, King of Aquitaine. In 787 he completed the conquest of the Lombards by the subjugation of the Duke of Beneventum.

The severest war undertaken by Charles was his contest with the Saxons. The struggle was of long standing, having been waged by his father and grandfather, and contemplated the incorporation of the Saxons into the Frankish kingdom and their conversion to Christianity. The obstinate resistance of the Saxons has scarcely been equaled in history. In 772 Charles advanced as far as the Weser, and destroyed the famous 'Irminsul'—according to heathen belief, the column supporting the earth. There were incessant revolts, but in 775 Charles carried his arms as far as the Elbe. In 777 he could even hold the Frankish National Assembly on Saxon soil, at Paderborn. But in 778, on news of Charles's absence in Spain, the Saxons again arose, and advanced almost to Cologne: but Charles again drove them back to the Elbe. They destroyed a Frankish army in the Süntel Highlands in 782: and Charles, after a new victory, avenged this disaster by the massacre, at Verden, of 4500 prisoners in one day. This caused a general rising of the Saxons; but, in 783-85, the Frankish monarch at last succeeded in reducing them to subjection. Their great leader, Widukind, submitted to baptism, and their principal chiefs became Charles's vassals. The Saxons north of the Elbe submitted in 804, and 10,000 of them were led into the interior of Germany as hostages. Charles proceeded to extend his arms beyond the boundaries of Saxony. The neighboring Slavs were either his allies or else were made tributary, and even the Bohemians were in part subdued. The Danes were confined to the north of the Eider, which became the northern boundary of Charles's kingdom.

Charles was equally successful in the southeast. His marriage, in 771, with Hildegarde, daughter of Duke Godfrey of Suabia, secured his influence in that duchy. In Bavaria his cousin, Tassilo, ruled practically as an independent sovereign. He had been allied with the Lombards, but in 781 he took the oath of allegiance to Charles. In 787 he rebelled, but was forced to surrender, and was deposed in 788. Tassilo had also been allied with the Avars, a fierce nomadic tribe which occupied the great plain of the middle Danube. The wars which Charles undertook against them in 791-96 resulted in the entire destruction of the nation, the Raab becoming the southeastern boundary of the Frankish kingdom. In 778, at the invitation of the Emir of Saragossa, who was in revolt against his suzerain, the Caliph of Cordova, Charles invaded northeastern Spain. This campaign against the infidel figures very prominently in mediæval legends, but in reality it was without direct result. Charles was summoned home by the news of a Saxon revolt, and in his return over the Pyrenees, the rear-guard of his army was assailed and annihilated, probably in the Pass of Roncesvalles, by the Basques. In this battle Roland (q.v.), afterwards the hero of a vast legendary literature, fell. In 779 Charles sent his son Louis to Spain, and after the fall of Barcelona he established the Spanish 'mark,' extending from the Pyrenees to the Ebro. It was the policy of Charles to establish such 'marks' on the borders of his dominions as bulwarks against the uncivilized nations by which they were surrounded. Against the Danes he established the Danish 'mark' south of the Eider: against the Sorabians the Thuringian 'mark;' against the Bohemians the Frankish 'mark;' and against the Southern Slavs the 'marks' of Carinthia and Friuli. The land in these districts was parceled out among Frankish vassals, and the margraves who ruled over them had far greater power than the ordinary counts. Charles also made use of the Church to secure his conquests. In the Saxon wars the Saxons were baptized by the thousands, and the bishoprics of Halberstadt, Paderborn, Minden, Verden, Bremen, Münster, and Osnabrück were erected. He also founded great monasteries, like Corvey and Herford, which were in fact fortresses in the enemy's country.

By the conquest, organization, and rule of such extensive dominions and of peoples so different in race and political tradition, Charles had virtually established an empire. His assumption of the imperial title and the revival of the Western Roman Empire were but the logical consummation of his great work. This event took place on the occasion of an expedition to Italy, the object of which was to support Pope Leo III. against the rebellious Romans. While Charles was worshiping in Saint Peter's on Christmas Day, 800, the Pope, unexpectedly, as it appeared, set a crown upon his head, and amid the acclamations of the people, saluted him as 'Carolus Augustus, Emperor of the Romans.' Whether or not the Emperor was aware of the intention of the Pope is a matter of conjecture only. In his familiar conversations he was wont to protest his ignorance of the projected coronation. In itself it added nothing directly to Charles's power, yet it greatly confirmed and increased the respect entertained for him, such was the lustre of a title with which were associated recollections of all the greatness of the Roman Empire. There is said to have been a scheme for the union of the newly revived Western Empire with the Empire of the East, by Charles's marriage with Irene (q.v.), the Byzantine Empress. If so, it failed by reason of Irene's overthrow. Besides the moral weight of Roman tradition, the imperial title added to Charles's office of King the powerful temporal guardianship of the Church. This was strongly emphasized in the new oath of allegiance to him, as Emperor, which Charles caused all his subjects to swear soon after his coronation. He proceeded to organize the empire with a view to strengthening the imperial power. The old national dukedoms having been abolished, Charles governed his dominions through counts, whom he himself appointed. Each count presided over an ancient canton (*Gau*), a subdivision of the dukedom. Three times a year the count held a regular court, which all freemen were bound to attend, and in times of war he assembled the military levy of the Gau. To watch over the counts Charles sent his 'Missi Dominici,' usually a count and a bishop, to the extreme ends of the empire. Their functions were to look after the administration of the Church, to collect the Emperor's revenues, and hold the superior court. Charles did not attempt to interfere with local Germanic institutions, but caused the ancient laws to be codified and reduced to writing. Although his rule was in fact absolute, he retained the ancient national assemblies, which every freeman might attend. They met twice a year, in spring (*Maifeld*; see CHAMP DE MAI) and in autumn, and decided upon matters of State, particularly on peace and war. Here the 'Missi Dominici' made their reports, and the Church councils were held. Besides the 'Missi' and his counselors, there were the two chief court officials—the Apocrisiarius, who stood at the head of Church affairs, and the Count Palatine (Comes Palatinus), who presided over the secular administration. The income from the royal domains, which Charles skillfully managed, together with the revenues from the administration of justice and free-will offerings, provided for the expenses of the State.

Charles promoted to the fullest extent the interests of the Church. He recognized in it a powerful ally, both in increasing and ruling his dominions. His wars were religious as well as political; he introduced Christianity into the countries which he conquered. He made the system of tithes compulsory throughout the empire, and richly endowed bishoprics and monasteries. His zealous coöperation with the bishops in bringing about disciplinary reform, his always active interest in doctrinal matters and solicitous participation in the national synods, contributed wonderfully to increase the power and influence of the Church. No sovereign in the history of Christendom contributed more actively and efficaciously than Charles to the propagation and strengthening of religion and the upbuilding of the Church, though the revival of the Western Empire in his person led eventually to the memorable conflict, which filled subsequent centuries, between Papacy and the Empire. He also effected a closer Church organization, by subordinating more strictly the bishoprics to the archbishoprics and by strengthening the hold of the bishop over the churches of his diocese.

No less glorious than his political achievements was the revival of science, literature, and art which Charles brought about—a renaissance all the brighter for the gloom by which it was preceded and followed. He summoned to his Court the greatest scholars of the age: Alcuin, the Englishman, who became the head of the Palace School; Paulus Diaconus, the Lombard, who wrote a history of his people; Peter of Pisa, the grammarian; Angilbert, and Theodulf, the greatest poets of the day, who wrote in imitation of the ancient authors; finally Einhard, Charles's secretary and friend. In this circle of scholars Charles moved as a comrade and friend, much as did Lorenzo de' Medici in the Platonic Academy of Florence. He himself possessed an amount of learning unusual in his age, in spite of the fact that he could not write, having begun to learn too late in life. He was very fond of his native tongue—the Frankish—and himself drew up a grammar of the language. He invented Frankish names for the months of the year and for the winds, and even caused a collection of old German poems and legends, then current, to be made, which his pious son Louis destroyed, because of its heathenism. In his Palace School, his own sons and those of the nobility received a liberal education; but he also commanded that each cathedral and monastery should have a school to which laymen, as well as clergy, should be admitted. The school which Alcuin established at Tours, under his patronage, was famous for centuries. He also established public schools for all freemen in connection with the monasteries and parishes. He was no less liberal in his patronage of the fine arts. He built sumptuous palaces, particularly at his favorite residences, Aix-la-Chapelle and Ingelheim—for he had no fixed capital—and many churches, chief among which was the Minster of Aix. He endeavored zealously to promote agriculture, manufactures, and commerce. He projected great national works, one of which was a canal to connect the Rhine and the Danube; but he deemed nothing beneath his attention which concerned the interests of his empire or of his people. He required his subjects to plant certain kinds of fruit-trees, the cultivation of which was thus extended northward in Europe. His own domains were an example of superior cultivation.

Charles the Great was one of the most imposing figures, not only of the Middle Ages, but of all history. His personality impressed itself upon the imagination of the people of the Middle Ages as that of no other man has done. Romances and legends grew up around his name, and those of his nobles, or paladins. According to contemporary accounts, he was above the ordinary stature and of a noble and commanding presence. He was fond of manly exercises, particularly of hunting, and his strength was prodigious. His mode of life was simple. In eating and drinking, he was very moderate. He wore the simple, ancient costume of his people, except on great state occasions, when he used Byzantine robes and ceremonial. His death took place on January 28, 814. He was buried in the Minster of Aix, and was succeeded by his son Louis, known as the Pious.

Bibliography. Besides his capitularies (q.v.), there are extant letters and Latin poems ascribed to Charles the Great. Consult Dümmler, *Poetæ Latini Ævi Carolini* (Leipzig, 1881-84). The chief source for his history is the biography, by his secretary, Einhard, *Vita Caroli Magni*, edited by Pertz, in the *Monumenta Germaniæ Historica*, and separately (Hanover, 1863); Engl. trans. by Glaister (London, 1877). Other sources are the letters and poems of Alcuin, Paulus Diaconus, and Angilbert, and the contemporary annals, for a description and editions of which consult Wattenbach, *Deutschlands Geschichtsquellen im Mittelalter*, Vol. I. (Berlin, 1893). The most detailed modern account of his reign is Abel and Von Simson, *Jahrbücher des fränkischen Reiches unter Karl dem Grossen* (Leipzig, 1883, 1888). Consult, also: Vétault, *Charlemagne* (Tours, 1876); Döllinger, *Das Kaisertum Karls des Grossen und seiner Nachfolger* (Munich, 1864); Haureau, *Charlemagne et son cour* (Paris, 1888). The best English works on Charles are: Mombert, *History of Charles the Great* (New York, 1888); Hodgkin, *Charles the Great* (London, 1897); Davis, *Charlemagne*, in "Heroes of the Nations Series" (New York, 1900); Mullinger, *Schools of Charles the Great* (London, 1877); consult, also: Clemen, *Die Porträtdarstellungen Karls des Grossen* (Aachen, 1890).

CHARLES II. Holy Roman Emperor. See Charles I., the Bald, King of France.

CHARLES III. Holy Roman Emperor. See Charles II., the Fat, King of France.

CHARLES IV. (1316-78). Holy Roman Emperor from 1346 to 1378. He was born at Prague, May 14, 1316, and was the son and successor of John of Luxemburg, King of Bohemia, who fell in the battle of Crécy in 1346. With the aid of Pope Clement VI., to whom he had previously taken an oath sacrificing several imperial prerogatives, he was elected Emperor by five electors on July 11, 1346. This was done because the Emperor Louis IV. (q.v.) had been placed under the greater excommunication by the Pope. Charles and Louis contended for the prize until the death of the latter in 1347. On Easter day, 1355, Charles

IV. was crowned Emperor at Rome. In 1356 he issued the Golden Bull (q.v.), establishing a new rule for the election of the King of the Romans. On June 13, 1365, he was crowned King of Arles. In 1376 he had his son, Wenceslaus, elected Emperor, to succeed him after his death, and secured the Pope's confirmation of the election, in spite of the provisions of the Golden Bull. He died at Prague, November 29, 1378. Charles was an artful politician, and directed his efforts mainly to securing power for his own family and for his hereditary kingdom of Bohemia, which was very flourishing under his reign. He, with the Archbishop of Prague, founded the University of Prague, on the model of that of Paris, in 1348. For his early years, till 1346, we have an autobiography, "Vita Caroli IV. ab ipso conscripta," in Boehmer, *Fontes rerum Germanicarum*, Vol. I. (Stuttgart, 1843).

CHARLES V. (1500-58). Holy Roman Emperor, and, under the title of Charles I., King of Spain. He was born at Ghent, February 24, 1500, and was the eldest son of Philip, Archduke of Austria, and of Joanna, the daughter of Ferdinand and Isabella of Spain. Philip's parents were the Emperor Maximilian and Mary, daughter and heiress of Charles the Bold, Duke of Burgundy. On the death of his father in 1506, Charles, at the age of six, inherited the Burgundian realm, consisting in the main of the rich and populous provinces of the Netherlands, then at the height of their prosperity. On the death of his grandfather, Ferdinand, in 1516, he became King of Spain, as his mother, Joanna, was of disordered intellect and incapable of reigning. To the Spanish Crown belonged Naples, Sicily, and Sardinia; the Spaniards were just entering upon their great career of conquest in the New World. Charles was not very favorably received by the Spanish nobles, who were doubtful of his rights and jealous of the followers whom he brought from Flanders, where he had been educated. The repression of the liberties of the people, which had already gone far under his grandfather, and which his son was to reduce to a system, continued unchecked under Charles, in spite of the appeals of the Cortes. All the abilities of his famous minister, Cardinal Ximenes, were requisite to prevent an open rupture. In the early part of his reign (1520) the towns of Castile were driven to revolt for the maintenance of their ancient liberties. It was with difficulty that the insurrection was put down (1521). (See Padilla, Juan de.) On the death of his grandfather, Maximilian, in 1519, Charles conjointly with his younger brother, Ferdinand, succeeded to the possession of the hereditary dominions of the House of Hapsburg (House of Austria). On June 28, 1519, he was raised to the imperial throne of Germany by the choice of the electors, the rival candidates being Francis I. of France and Henry VIII. of England, and was crowned at Aix-la-Chapelle, October 23, 1520. Owing to the jealousy of his Spanish connections, he was required to sign an election agreement (*Wahlkapitulation*) guaranteeing certain rights to the German nation, a practice followed by his successors in the imperial office. Charles was now by far the most powerful sovereign in Christendom. In his earlier years he had been frivolous and dissolute, but he now became mindful of the duties and dignity of his high position. He ascended the imperial throne at a time when Germany was in a state of unprecedented agitation, because of the movement set on foot by Luther (q.v.). To restore tranquillity, a great diet was held at Worms in 1521, before which Luther made the memorable defense of his doctrines. Just at this moment the great struggle between France and Spain broke out afresh, Francis I. taking up arms against his rival, whose attention was drawn away from the internal affairs of Germany. Thus, instead of vigorously assailing the Protestant movement when it might still have been in his power to quell it, Charles, who was not alive to its significance, permitted it to take deep root.

The war between Charles and Francis, in which the former had Henry VIII. of England as an ally, and was strengthened by the defection of the powerful Charles of Bourbon (q.v.), proved disastrous to France. The French were swept out of Lombardy, and in an attempt to regain possession of it, Francis was defeated before the walls of Pavia, February 24, 1525, and taken prisoner. He was forced to sign a humiliating treaty at Madrid, January, 1526; but hardly had he been set at liberty, when he prepared to renew the struggle, with Henry VIII. now on his side and with the support of Pope Clement VII., of the House of Medici, who, alarmed at the victories of Charles, was anxious to rid Italy of the Imperialists, and induced some of the Italian States to join him. The Emperor's forces, under Frundsberg and Charles of Bourbon, took Rome itself by storm (1527), plundered it, and made the Pope a prisoner. Charles pretended great regret, went into mourning with all his Court, and caused prayers to be said for the Pope's liberation, while, by his own direction, the Pope was kept for seven months a captive. The Peace of Cambrai, between Charles and Francis, in 1529, deprived France of Lombardy, for the possession of which she had fought so furiously. In 1530 Clement VII., into whose scheme for the restoration of the Medici in Florence Charles had entered, crowned the victorious monarch at Bologna as King of Lombardy and Emperor of the Romans (the last coronation of a German Emperor by the Pope). Simultaneously with these events, a great drama was being enacted in the basin of the Danube, which brought a still greater concentration of power in the hands of the Hapsburg dynasty. In 1526 the Ottoman Sultan, Solyman the Magnificent, laid low the power of Hungary in the battle of Mohács. The Hungarian monarch, Louis II., who was also King of Bohemia, did not survive the defeat, and Ferdinand of Hapsburg, his brother-in-law, was chosen his successor in Bohemia, while some of the nobles in Hungary also conferred upon him the royal crown. Thus were laid the foundations of the modern Hapsburg monarchy of Austria-Hungary. Previous to this, in 1521-22, Charles had relinquished to Ferdinand the sole sovereignty over the principal portion of the old hereditary Austrian dominions. Having made peace with his formidable rival, Charles now thought to put an end to the religious differences in Germany, and to repel the Turks, who had overrun Hungary and laid siege to Vienna. But the diet at Augsburg, in 1530, proved how vain was the hope of restoring the former state of things in Germany; and when the Emperor refused to recognize the confession of the Protestants (see Augsburg Confession), they refused to help him against the Turks. In 1531 the Protestant princes formed the League of Schmalkald (q.v.), and allied themselves with France and England for their own protection. This, and the continued assaults of the Turks, compelled the Emperor to yield in some measure to the demands of the Protestants, and to conclude the Peace of Nuremberg (1532). In 1535 Charles undertook an expedition from Spain against the pirate Barbarossa, who had established himself in Tunis, and whose vessels did great injury to the commerce of Spain and Italy. In this expedition he was completely successful, and set free no fewer than 22,000 Christians, who had been held as slaves. War again broke out with France. An armistice for ten years was concluded at Nice in 1538, which left the bulk of the dominions of the despoiled Duke of Savoy in the hands of Francis. Charles visited Paris, where he was magnificently entertained. In 1540 the proud city of Ghent, the birthplace of the Emperor, received a terrible chastisement at his hands for daring to resist his mandates. In 1541 Charles undertook an expedition against Algiers, but returned discomfited. In 1542-44 Charles was engaged in a fresh war with France, Henry VIII. being once more his ally. It was terminated by the Treaty of Crespy, advantageous to the Emperor. The suspension of the struggle with France left the Emperor at liberty to turn his arms against the Protestants of Germany, at whose head were Philip the Magnanimous, Landgrave of Hesse, and John Frederick, Elector of Saxony. Charles received the support of the ambitious Protestant prince, Maurice, Duke of Saxony (of the Albertine line). The victory of Mühlberg, April 24, 1547, placed the Protestants at the mercy of Charles, who deprived John Frederick of his territories. In 1548 the Augsburg Interim was published, fixing the degree of religious toleration to be accorded in Germany pending the decision of the Council of Trent, which had been opened in 1545. In 1551 Magdeburg, a great stronghold of Protestantism, succumbed to the arms of Maurice of Saxony. But this prince himself now became thoroughly alarmed at the arbitrary manner in which the Emperor was proceeding to carry out his political aims, and suddenly turned his arms against him, allying himself with Henry II. of France. Charles was compelled to flee before the arms of the Protestants, and in 1552, through his brother Ferdinand, he concluded with them the Peace of Passau, by which the Lutheran States were allowed the exercise of their religion. A more definite settlement was made, in the Peace of Augsburg, in 1555. In the meanwhile Henry II. seized the three bishoprics of Toul, Metz, and Verdun (1552), and an attempt of the Emperor to reconquer Metz failed miserably.

Weary of the constant struggles and heavy responsibilities of his ill-assorted realms, Charles now declared his resolution to seek repose and devote the remainder of his days to God. In 1555-56 he resigned the Netherlands and Spain to his son Philip, and abdicated the imperial crown in favor of his brother Ferdinand, and retired to the Monastery of Yuste, in Estremadura. At Yuste Charles spent two years, partly in mechanical pursuits, partly in religious exercises, which are said to have assumed a character of the most rigid asceticism, and partly in active participation in politics. He died September 21, 1558. By his wife, Isabella, daughter of King Emmanuel of Portugal, he had one son, his successor, Philip II. of Spain, and two daughters. Charles V. was a prince of remarkable executive powers. He showed a shrewd and sometimes statesmanlike ability in meeting the difficult problems of his reign; but this gave way more and more to the religious temperament inherited from the Spanish side of his house. While he spared his Protestant subjects in Germany for political reasons, he persecuted heresy unsparingly in Spain, where policy imposed upon him no restraint. As a general he ranks high. In temperament and disposition he was cold, phlegmatic, stoical, and devoid of chivalry.

Consult: W. Robertson, *History of the Reign of Charles* V., with an account of the Emperor's life after his abdication by Prescott (Philadelphia, 1864-67); Baumgarten, *Geschichte Karls* V. (Stuttgart, 1885-92); Lanz, *Korrespondenz des Kaisers Karl* V. (Leipzig, 1844-46); Sandoval, *Historia de la vida y hechos del Emperador Carlos* V. (Valladolid, 1604); Sepulœda, *De Rebus Gestis Caroli* V. (Madrid, 1780); Ranke, *Deutsche Geschichte im Zeitalter der Reformation* (Leipzig, 1894).

CHARLES VI. (1685-1740). Holy Roman Emperor from 1711 to 1740, and the last of the direct male line of the House of Hapsburg. He was the second son of the Emperor Leopold I., and was born October 1, 1685. His father wished to secure for him the crown of Spain; but Charles II. of Spain assigned it by testament to Philip of Anjou, whereupon arose the great War of the Spanish Succession, Britain and Holland taking part with the Emperor against France, for the maintenance of the balance of power in Europe. (See SUCCESSION WARS.) Charles was acknowledged by the Allies as Charles III. of Spain, but had not succeeded in obtaining permanent possession of the kingdom when the death of his brother, the Emperor Joseph I., recalled him to Germany in 1711; and as he now became Emperor of Germany, England and Holland concluded the Peace of Utrecht with France in 1713, not wishing to see him also King of Spain. Charles continued the war for some time; but by the Peace of Rastadt (1714) gave up his claim to Spain, being confirmed, however, in possession of the Spanish Netherlands and of the Spanish possessions in Italy. He was successful in a war against the Turks, marked by splendid Austrian victories under Prince Eugene, and concluded by the Treaty of Passarowitz (1718), and in a war with Spain, which arose out of the project of the Spanish minister, Alberoni (q.v.), and in which the Quadruple Alliance was formed—France, England, and Holland joining the Emperor against Spain. Charles had lost his only son, and being anxious to secure the throne to his own descendants, named his daughter, Maria Theresa (q.v.), as his heiress, by a Pragmatic Sanction, published April 19, 1713. For more than twenty years the foreign policy of Charles was dictated by the sole desire of obtaining the ratification of the Pragmatic Sanction from the European powers. To accomplish this he sacrificed Austrian territories in Italy and Spain, and the commercial prosperity of Flanders to England and Holland. (See OSTEND COMPANY.) He won over Prussia by the concession of extensive privileges, and bribed Russia by allowing it a free hand in

Poland. He was unsuccessful in the so-called War of the Polish Succession, waged against France and Spain, in the course of which Don Carlos conquered the Two Sicilies in 1734-45. He was also worsted in a second war with the Turks, terminated by the Peace of Belgrade, in 1739, in which Austria made some cessions of territory. He died October 20, 1740. He was of a mild and benevolent disposition, but full of superstition and conservative prejudices. Consult: Mailáth, *Geschichte des österreichischen Kaiserstaates* (Hamburg, 1834-50); Coxe, *History of the House of Austria* (London, 1847).

CHARLES VII. (1697-1745). Holy Roman Emperor from 1742 to 1745. He was the son of Maximilian Emmanuel, Elector of Bavaria, and for some time Governor of the Spanish Netherlands. After the conquest of the Bavarian territories, and the pronunciation of the ban of the Empire against his father by the Emperor Joseph I. (see article SUCCESSION WARS), he was for some time a prisoner; but after the death of Joseph, Charles married the latter's youngest daughter, and in 1726 succeeded his father as Elector of Bavaria, as such styled Charles Albert. He refused his consent to the Pragmatic Sanction (q.v.); and, on the death of Charles VI. in 1740, advanced a claim to the Austrian dominions in right of his wife, and upon the further ground of a testament of Ferdinand I. At first he was successful with the aid of the French forces, and caused himself to be proclaimed Archduke of Austria at Linz and King of Bohemia at Prague. In 1742 he was elected Emperor. The Hungarians, however, rose in favor of Maria Theresa, and he was driven from Austria and from Bohemia, and for a time even from his Bavarian capital, Munich. Disease and calamities combined to cause his death, January 20, 1745. "Misfortune," he said, "will never leave me till I leave it."

CHARLES I. (1600-49). King of England, Scotland, and Ireland from 1625 to 1649. The second son of James I. of England and VI. of Scotland, he was born at Dunfermline, November 19, 1600, and created Duke of Albany at his baptism, December 23. He was a delicate child, tongue-tied, and troubled with weak joints and ankles. In 1605 he was created Duke of York, and on the death of his brother Henry, November 6, 1612, became heir apparent, but was not created Prince of Wales until November 3, 1616. He outgrew his physical defects, with the exception of a slight stutter; became a diligent theological student, an accomplished scholar, and skillful in the sports of tilting, tennis, and marksmanship. At twenty-two years of age he had developed artistic and musical tastes, and was distinguished for modesty of conduct and morals. Negotiations for his marriage were made, first with Princess Christian, sister of Louis XIII. of France, in 1613, and then with the Infanta Maria of Spain, daughter of Philip III., in 1614. In February, 1623, occurred his journey to Spain, at the suggestion of his favorite companion, Buckingham, who accompanied him. Unannounced, he arrived in Madrid, to the consternation of the Spanish statesmen, who had already decided against the marriage. After much duplicity on both sides, Charles returned to England in October, being received with popular acclamation. Negotiations were broken off on religious pretexts, although the unwillingness of Philip to help in the restoration of Charles's brother-in-law, Frederick, to the Palatinate, was the real cause. Charles aroused national enthusiasm by advocating war, and expressed his readiness to conquer Spain; but his father wished for a military expedition to the Palatinate. On March 27, 1625, James died, and Charles succeeded to the throne. To gain France as an ally, on May 1 he married, by proxy, Princess Henriette Marie of France (1609-69), receiving his bride at Canterbury, on June 13. The national admiration was quenched by this marriage, with its accompanying violations of parliamentary Protestant pledges; and before a year had elapsed, Charles, finding the Queen's Catholic retinue of 440 persons too troublesome, deported them to France. His marriage subsequently proved particularly happy. His reign, however, was doomed to failure. He was a puppet in the hands of his favorite, Buckingham, whom he had appointed Prime Minister in defiance of public wishes, and whose warlike schemes ended ignominiously. Three Parliaments, convoked in four years, were dissolved in royal exasperation at their refusal to comply with his arbitrary measures, and public feeling became embittered. The third Parliament presented the *Petition of Right* (q.v.) in 1628. The King temporized and conceded, then—although Buckingham's assassination had removed one cause of the contention—dissolved Parliament and caused some of the leading members to be imprisoned, one of whom, Sir John Eliot, was allowed to sicken and die in the Tower, although he presented several petitions for a temporary release. Influenced by the Queen, and with Laud and Wentworth as chief advisers, Charles governed without a Parliament for eleven years, the despotic Star Chamber and High Commission courts giving semblance of legal sanction to forced loans, poundage, tonnage, ship money, and other extraordinary measures to meet governmental expenses. Republican principles developed and expanded, toward which Charles opposed a policy of severe repression. His attempt to impose Episcopacy provoked the Scotch to restore Presbyterianism, and to adopt the Solemn League and Covenant, February 28, 1638. In 1639 Charles assembled an army to enforce his will; the Covenanters retaliated and advanced to the Border. Unable to proceed without supplies, in 1640 Charles summoned the 'Short Parliament,' which he dissolved in three weeks, as the members refused to listen to his demands, but drew up a statement of public grievances, demanded an inquiry into Eliot's death, and insisted on peace with Scotland. Obtaining money by irregular means, Charles advanced against the Scots, who crossed the Border and defeated his army at Newburn-upon-Tyne, and soon afterwards occupied Newcastle and Durham, everywhere receiving popular sympathy and support. His money exhausted, the King was compelled to call the 'Long Parliament,' which met November 3, 1640. Led by the ripe, sagacious, and dauntless Pym, it proceeded to redress grievances, and showed its resolution by impeaching and imprisoning the instigators of royal despotism—Laud, and Wentworth, who had been created Earl of Strafford. The King tried to save Strafford by bribery; then consented to a plot to overawe Parliament by military force, which being discovered, Strafford was condemned to death. Charles humbly asked for a milder punishment; but, in trepidation for the life of his Queen, which he considered in danger from mob violence, signed Strafford's death warrant, and confirmed a bill by which Parliament was not to be dissolved without its own consent. The King was now pledged to constitutional rule; but unhappily, imbued with extreme notions of kingly prerogative, could not rest content. He visited Scotland, hoping by concessions to win favor and armed support; but while there the Irish Rebellion and Ulster Massacre occurred, and, knowing that Charles had intrigued for the military assistance of the Irish Catholic lords, Parliament enlarged its demands. The Commons accepted a petition against the royally appointed bishops who disputed their authority, and who were mobbed on their way to the House of Lords.

On his return from Scotland the King had yielded to the provisions of 'The Grand Remonstrance'; but now, learning of the impending impeachment of his Queen, who had sought assistance from Rome, he planned the sudden *coup* of appearing in the Commons with an armed force, and, accusing Pym, Hampden, Hollis, Haselrig, and Strode of treason, demanded their arrest and delivery to him.

Intense excitement ensued; shouts of 'Privilege of Parliament' were raised; the indicted members, forewarned, had taken refuge in the City, and the King retired with undignified threats. The country was aroused, Parliament and the nation were declared in peril, and London prepared to defend itself. Met with his own weapons, the alarmed King fled with his family to Hampton Court. Seven months later he raised the royal standard at Nottingham, August 22, 1642, and civil war commenced and proceeded, although arbitration was vainly attempted from time to time. The Royalists at first were the victors; but after several reverses the Parliamentary forces acquired experience and discipline, and Cromwell and Fairfax annihilated the royal army at Naseby, June 14, 1645. Guerrilla warfare continued until Charles gave himself up to the Scottish army at Newark, on May 5, 1646. Negotiations were fruitlessly renewed, and he was delivered to the English Parliament, who assigned him a residence at Holmby House, near Northampton. After four months, his qualified reply to a Parliamentary proposal resulted in his conveyance by Cornet Joyce to Hampton Court. He continued his intrigues and opposition to all constitutional propositions, and, after three months, escaped to the Isle of Wight, where he hoped to receive aid from the governor of Carisbrooke Castle, but was imprisoned. Cromwell and the Independents lost patience, and compelled Parliament to pass an act of treason against further negotiation with the King, who was removed to Hurst Castle. The Scots and English Presbyterians, deeming the regal person sacred and inviolable, thought to rescue him, but were defeated, and their representatives expelled from Parliament, which appointed a court to judge the King. He was removed from Hurst Castle to Windsor, on December 23, 1648, and on January 20, 1649, was taken to Westminster Hall, where the court was opened with great solemnity. Charles repudiated its legality, and refused to plead. On the 27th he was sentenced to death as a tyrant, murderer, and enemy of the nation, by sixty-seven out of the original one hundred and thirty-five judges (Gardiner, *Civil War*, IV., 293, 308-13). Scotland protested, the royal family entreated, France and the Netherlands interceded, in vain. After a pathetic parting from two of his children, he calmly prepared for death and bore himself with dignity. He was beheaded at Whitehall, January 30, 1649. The last words of his speech on the scaffold were, "I must tell you that liberty and freedom consist in having of government those laws by which the lives and the goods of the people may be most their own. It is not having share in the government, sirs; that is nothing pertaining to them," a sentiment that was plagiarized by the opponents of Chartism (q.v.) as late as 1848.

In private character Charles was a man of culture, kind, of irreproachable life, and of great physical courage; but in political affairs he was unscrupulous and blindly obstinate in his belief in the 'divine right of kings.' By Charles II.'s personal edict at the Restoration, until its cancellation by Parliament in 1859, January 30 received special observances in the Anglican Church as "the day of the martyrdom of the Blessed King Charles I." After his death appeared *Eikon Basilike: The Portraiture of His Sacred Majesty in His Solitude and Sufferings*, attributed to the King, but written by Bishop Gauden, who, in 1651, published at The Hague *Reliquiæ Sacræ Carolinæ, The Works of that Great Monarch and Glorious Martyr, King Charles I.* The best works on the reign are: Gardiner, *History of England, 1603-42* (10 vols., London and New York, new edition 1883-84), and his *Civil War* (4 vols., London, New York, and Bombay, 1894-97), containing full citation of the original sources; also his *Puritan Revolution* (London, 1876); Chancellor, *Charles I., 1600-25* (London, 1886); Harris, *Life and Works* (London, 1758); Skelton, *Life of Charles I.* (London, 1898); Masson, *Life of Milton* (7 vols., London, 1873-94); and Disraeli, *Commentaries on the Life and Reign of Charles I.* (5 vols., London, 1828-31). Original materials are contained in: *Letters of Charles I. to Henrietta Maria* (London, 1836); Clarendon, *Great Rebellion* (6 vols., Oxford, 1888); Whitelocke, *Memorials* (4 vols., new edition, Oxford, 1853); Gardiner, *Constitutional Documents* (Oxford, 1889); and the *Calendars of State Papers*, edited by Hamilton (London, 1890-93).

CHARLES II. (1630-85). King of England, Scotland, and Ireland from 1649 (reigned from 1660) to 1685. He was the second, but eldest surviving son, of Charles I., and was Prince of Wales from his birth. He was born at Saint James's Palace, London, May 29, 1630, and baptized by Bishop Laud on July 7, Louis XIII. of France being one of his sponsors. At eight years of age an establishment was provided for him as heir apparent, with William Cavendish, Earl of Newcastle (q.v.), as governor, and Dr. Brian Duppa as tutor. The following year he broke his arm, and his life was endangered by a severe illness. He took his seat in the House of Lords in 1640, and his first public act was to carry his father's letter in favor of Strafford to the peers. He held a nominal command in the early campaigns of the Civil War, and was present at Edgehill in 1642, where he narrowly escaped capture. Appointed general of the western forces, he parted from his father at Oxford, March 4, 1645, and remained in safety in Somerset, Devon, and Cornwall; after Naseby, he escaped by way of Scilly and Jersey and joined his mother in Paris, where he remained for two years, to his moral disadvantage. In July, 1648, he sailed from Helvoetsluis with nineteen ships, for the Thames, where he took several prizes. He issued a proclamation of conciliation to the Londoners and Scots, and returned to The Hague, where, during his father's trial, he did his utmost to save him, forwarding a blank charter with his signature attached for Parliament to inscribe its own terms of clemency. At his father's death he assumed the title of King, and was proclaimed in Scotland, Ireland, the Channel Islands, and one or two places in England. After vacillating between Holland, France, and Jersey, with the intention of invading Ireland, he returned to Holland, and, embarking at Terheyden for Scotland, arrived in Cromarty Firth June 16, 1650, despite an attempt to intercept him. On September 3 a Scottish force fighting for him was defeated at Dunbar, and this hastened his coronation at Scone, January 1, 1651, after an acknowledgment of his father's faults and various declarations and concessions of a feeble character. He suddenly invaded England the following August, with 10,000 men, and was proclaimed King at Carlisle and other places on his advance. Cromwell hastened to meet and surround him, and, after two encounters, routed his army at Worcester, September 3, 1651. Charles was hunted and a price was put upon his head, but after hiding at Boscobel (q.v.) and other places, through the loyalty of friends and his own courage and address, he safely embarked at Shoreham on October 15, and landed at Fécamp, Normandy, the next day. Eight years of impecunious and profligate exile were variously spent in France and at Cologne and Bruges, until not long after Cromwell's death, when, the country being threatened with military despotism, the popular wish throughout England for the restoration of royalty was consummated by General Monk (q.v.), after Charles's conciliatory Breda declaration, and he was proclaimed King at Westminster, May 8, 1660. He landed at Dover on the 26th, and was welcomed, at Whitehall, by the two houses of Parliament on May 29, 1660, after an enthusiastic acclamation by thousands on his progress through London. He was crowned on April 23, 1661. His first Parliament, distinguished by abasement and insistence on 'royal prerogative,' gave him an untrammeled course. Clarendon, his dignified companion in exile, was appointed chief minister. Episcopacy was restored, and English and Scotch Nonconformists and Presbyterians subjected to persecution. He extended an indemnifying act, dating from January 1, 1637, to June 24, 1660, to all political offenders, excluding the regicides, of whom thirteen were executed, while the bodies of Cromwell and Ireton were hung in chains, and the remains of Blake, Bradshaw, and others cast out of Westminster Abbey into potter's fields. Extravagant, and always in want of money, Charles gladly assented to the abolition of the feudal rights of knight service, wardship, and purveyance in consideration of an annuity of £1,200,000. On May 20, 1662, he married Catharine of Braganza (q.v.) for her large dowry. He shamefully sold Dunkirk and Mardick to the French, and for a pecuniary consideration made war against the Netherlands, in opposition to English commercial interests and the popular feeling. In 1667 De Ruyter, commanding the Dutch fleet, sailed up the Medway and burned several war-ships at Chatham, and Charles was compelled to conclude the ignominious Peace of Breda. This precipitated Clarendon's downfall, which was followed by the appointment of the unpopular Cabal Ministry (q.v.), who sought to restore Catholicism and absolution. Charles sought to conciliate the people by the Triple Alliance, in May, 1668, with Sweden and the States-General; but the French Court persuaded him to make war against the United Provinces. He basely accepted a pension from the French Government; and, as even this, with all that he could get from his Parliament, was insufficient for his expenses, he resorted to illegal means to raise money. The dubious 'popish plot' (see OATES) against the King's life caused great excitement among the people, and Lord Stafford and other persons were unjustly executed. The Parliament of 1679, against the will of the Court, enacted the celebrated Habeas Corpus Act (q.v.), and a bill was mooted to exclude the King's brother, the Duke of York, from the succession on account of his Roman Catholicism. The King had, however, crushed the Presbyterians of Scotland, and, more absolute than any of his predecessors, adopted most arbitrary measures. The city of London was deprived of its privileges, because of the election of a sheriff disagreeable to the Court. The Rye House plot (q.v.), a widely extended conspiracy, was discovered in 1683, and cost the lives of a number of persons, among whom were Lord Russell and Algernon Sidney. Charles had begun to recognize the necessity of a more liberal policy, when an attack of apoplexy caused his death, on February 6, 1685. In his dying hours he received absolution from a Roman Catholic priest, although he had not previously avowed his attachment to that religion. His reign was full of events dishonorable to his country, of which he himself was generally the cause. His life was dissolute, the number of his mistresses and the profligacy of his Court being scarcely paralleled in British history. His affability, however, won him popularity, which was familiarly expressed by the nicknames of "The Merry Monarch" and "Old Rowley." Consult: Pepys, *Diary*, ed. Wheatley (London, 1899); Evelyn, *Diary* (new ed., London, 1854); Clarendon, *History of the Rebellion and the Civil Wars in England* (last ed., Oxford, 1849); Burnet, *History of the Reformation of the Church of England* (last ed., London, 1873); Hallam, *Constitutional History of England* (8th ed., London, 1855); Macaulay, *History of England* (8th ed., London, 1852); Somers, *Tracts*, Vols. VII., VIII. (London, 1809-15); *Calendar of State Papers of the Reign of Charles II.* (ed. Green, 21 vols., London, 1860-87); Harris, *Life of Charles II.* (London, 1766); Hoskyns, *Charles II. in the Channel Islands* (London, 1854); Cunningham, *Story of Nell Gwynn* (new ed., London, 1893); Molloy, *Royalty Restored* (London, 1885); Forneron, *Louise de Kéroualle* (Paris, 1886); "Charles II." in Stephen, *Dictionary National Biography*, Vol. X. (New York, 1887); Jesse, *Memoirs*, Vol. III. (new ed., London, 1876); Masson, *Life of Milton* (London, 1873-94). For favorable estimates of Charles, consult: Guiney, "An Enquirendo into the Wit and Other Good Parts of his Late Majesty King Charles the Second," in *Patrins* (Boston, 1897); and Street, "An Eulogy of Charles the Second," in *Quales Ego* (London, 1896).

CHARLES I., the Bald (translation of Fr. *Charles le Chauve*) (823-77). King of France from 843 to 877; as Roman Emperor, Charles II. He was the son of Louis the Pious, by his second wife, Judith. The determination of Judith to secure a kingdom for her son led to repeated wars between the sons of Louis, until, by the Treaty of Verdun (q.v.), in 843, Charles received the western portion of the empire, which from this time may be called the Kingdom of France; or, more strictly, the West-Frankish Kingdom. The government of Charles was weak; the great nobles were rapidly becoming independent; the Northmen pillaged the country, almost without resistance on the part of Charles, who bribed them to depart. Yet on the death of the Emperor Louis II., in 875, Charles received the imperial crown, through the favor of the Pope. He died in 877.

CHARLES II., the Fat (translation of Fr. *Charles le Gros*, Ger. *Karl der Dicke*) (839-88). King of France after 885; as Roman Emperor, Charles III. He was the third son of Louis the German (q.v.). At his father's death, in 876, he became King of only a portion of Germany; but within eight years seven kings of the Carolingian line met with untimely deaths, and only one left a legitimate heir. In 885 the only two representatives of the male line were Charles and a boy five years old, afterwards Charles the Simple of France. Consequently, Charles was recognized as King, and ruled over almost all the lands which had formed the empire of Charles the Great. He was also crowned Emperor of the Romans in 881. He was a weak and cowardly ruler. When the Northmen besieged Paris he made no resistance, but bribed them to leave the capital, and allowed them to plunder elsewhere. His subjects revolted. He was deposed in 887, and died in January, 888.

CHARLES III., the Simple (translation of Fr. *Charles le Simple*, or *le Sot*) (879-929). King of France from 893 to 929. He was the posthumous son of Louis the Stammerer. At the death of Charles the Fat, Eudes, Count of Paris, was chosen King of France; but many of the Franks were still faithful to the Carolingian dynasty (q.v.), and rallied about Charles. In 893 he assumed the crown, and, after three years of fighting, forced Eudes to promise him the succession to the kingdom. Consequently, on the death of Eudes, in 898, he was generally recognized as King; but he proved to be a weak ruler. His most important act was the cession of the future Normandy (q.v.) to the Northmen. In 922 his subjects revolted. In 923 he was made a prisoner, and died in captivity in 929.

CHARLES IV., the Fair (translation of Fr. *Charles le Bel*) (1294-1328). King of France from 1322 to 1328, and the last of the Capetian line. He was the youngest son of Philip IV., the Fair, and succeeded his brother, Philip V. His policy was to strengthen and consolidate the royal power. This he did by repressing unruly nobles, increasing the royal revenue, and adding cities, such as those of the Agenais, which he took from the English, to the royal domains. He introduced some financial reforms and expelled the Lombard bankers, who were much disliked.

CHARLES V., the Wise (translation of Fr. *Charles le Sage*) (1337-80). King of France from 1364 to 1380. He was the son of King John II., the Good, and on his father's being made prisoner by the English at the battle of Poitiers (September 19, 1356) he assumed the regency. The most significant event of his rule was the vigorous effort of the peasants, aided by a part of the bourgeoisie, to deliver themselves from the tyranny of nobles and the Court, which resulted in the popular uprising called the Jacquerie (q.v.). Upon the death of his father, in 1364, Charles ascended the throne. By his cautious policy he succeeded in introducing order in the kingdom, and in reëstablishing the power of the Crown, which had been much shaken. War with England raged for a number of years, but with results highly favorable to Charles, who stripped his enemies of all their conquests in France except a few fortified places. He died September 16, 1380. Charles was a generous patron of literature and the arts. He founded the Bibliothèque Royale, and increased the privileges of the university. He rid himself of the so-called 'grand companies'—bands of mercenaries who were terrorizing many parts of the country—by employing them in wars outside of France. (See Du Guesclin.) He built the Bastille to keep the turbulent citizens of Paris in order.

CHARLES VI. (1368-1422). King of France from 1380 to 1422. He was the son and successor of Charles V., and less than thirteen years of age at his father's death. For several years he was under the guardianship of four uncles, one of whom (the Duke of Anjou) acted as regent. Their ambitions led to civil war. In 1388 Charles took the government into his own hands, and ruled well for some years, till he became insane. A regent was appointed, and party strife broke out again. The two great parties into which the nation was divided were those of Orléans and Burgundy. Each party, at different times, called in the English to its aid. Henry V. took advantage of the civil conflict, and at the battle of Agincourt, in 1415, won a victory which left France almost helpless. Murders, massacre, and all the horrors of civil war devastated France until, in 1420, a peace was made at Troyes, by which Charles VI. disinherited his son and accepted Henry V. as his successor. He died October 21, 1422, leaving most of France in the hands of the English. See Agincourt; Artevelde, Philip van; France.

CHARLES VII. (1403-61). King of France from 1422 to 1461. He was the fifth son and the successor of Charles VI., and was born on February 22, 1403. When his father died Charles had little prospect of ruling France. Paris and almost all the north were in the hands of the English, who proclaimed as King Henry VI. of England, who was then 18 months old, and made the Duke of Bedford regent. For the first six years Charles showed little energy, and was compelled by the English to evacuate Champagne and Maine. In 1427 the French forces obtained their first success, when the English failed in their siege of Montargis; but in October, 1428, the latter invested Orléans, which was the most important city held by the party of Charles, and on February 12, 1429, the French met with a disastrous defeat at Harengs. At this critical moment Joan of Arc (q.v.) came to the King's aid, and the siege of Orléans was raised on May 8, 1429. Charles was consecrated King at Rheims, July 17, 1429. The English gradually lost their possessions in France, and the Duke of Burgundy, their ally, went over to Charles. The latter entered Paris in 1436, and in the following years the English lost all their French possessions except Calais. The last battle, a disastrous defeat for the English, was at Castillon, July 17, 1453. After he was established on the throne, Charles devoted himself to the reorganization of the Government, to the reform of the finances, and to the formation of a powerful and well-disciplined army. He strove by every means to increase his own power, but his government was not despotic, and France recovered from the effects of the terrible calamities of the long war. Charles encouraged commerce and literature, and had the prosperity of his subjects at heart; but he was timid and irresolute, afraid of plots against himself, and almost continuously under the control of some woman. He made no effort to save the Maid of Orléans from her fate. For many years he yielded in almost everything to the wishes of his mistress, Agnes Sorel, who, however, exercised a beneficent influence over him. See Agnes Sorel.

CHARLES VIII. (1470-98). King of France from 1485 to 1498. He was born at Amboise, and succeeded to the throne on the death of his father, Louis XI., in 1483. For some time the Government was carried on under the regency of his sister, Anne of Beaujeu, who displayed fine political statesmanship in defending the rights of the Crown against the encroachments of the States-General, in the repression of the feudal princes, and in the annexation to France of Brittany through the marriage of its Duchess, Anne, to the young King. When Charles attained his twenty-first year he took the royal power into his own hands. He was a high-spirited, generous youth, and a good king; but his fame rests less on his rule in France than on the part he played in the history of Italy. Solicited, in 1494, by Ludovico il Moro, Duke of Milan, to help him against Alfonso of Naples, Charles revived the ancient claims of the House of Anjou to the Kingdom of Naples and achieved its conquest the following year. The Italian princes were alarmed at his success, and the League of Venice was formed against him, by the Pope, the Emperor, Maximilian I., Ferdinand of Aragon, Venice, and Milan. An attempt was made to bar his exit from Italy; but at Fornovo, near Piacenza, Charles broke through a powerful army and safely effected his retreat. It was with difficulty that he was deterred by his councilors from resuming his warlike designs on Italy. Charles's incursion into that country marks an epoch in the history of the peninsula. Left to itself, Italy might have attained national unity, as Spain did, or France. With the incoming of Charles began the intrusion of the northern nations into Italian affairs, and that play of policy which went on for 400 years in the distracted country, and did not end till Victor Emmanuel drove the last foreigner from Italian soil in 1870. Consult: *Memoirs of Philip de Comines*, translated (London, 1855); Delaborde, *Charles VIII. en Italie* (Paris, 1884); Ségur, *Histoire de Charles VIII.* (Paris, 1884).

CHARLES IX. (1550-74). King of France from 1560 to 1574. He was born at Saint-Germain-en-Laye, June 27, 1550. Charles succeeded his elder brother, Francis II., at the age of ten, under the regency of his mother, Catharine de' Medici (q.v.). He was declared of age three years later, but his mother continued to rule in his name, though he bore the responsibility for her violent deeds. Intrigues and civil wars marked the whole course of his unhappy reign. The Huguenots were driven to take up arms in 1562. The barbarities and excesses practiced both by the followers of Guise and by the partisans of Condé (outrages in which Catholics and Huguenots were alike involved) would have been sufficient to characterize this reign as one of the most miserable in French history. But the diabolical massacre of Saint Bartholomew (q.v.), which was deliberately planned and executed by Catharine solely for political purposes, eclipsed all the other brutalities of the epoch. There has been much dispute as to the responsibility of Charles IX. for the various atrocities of his reign; but it is certain that throughout his life he was too weak to resist his strong-minded mother. Charles died at the Château de Vincennes, May 30, 1574. Consult Mérimée, *Chronique du règne de Charles IX.* (Paris, 1889).

CHARLES X. (1757-1836). King of France from 1824 to 1830, the last sovereign of the elder line of the House of Bourbon. He was born in Versailles, October 9, 1757. He was the younger brother of Louis XVI. and Louis XVIII., bore the title of Count of Artois, and in 1773 married the Princess Maria Theresa of Savoy. After the outbreak of the Revolution in 1789, he became the leader of the *émigrés*. In 1795 he sailed with an English expedition to Brittany to arouse the French Royalists against the Revolutionary Government. Although the Vendéeans were ready to rally around his standard in great force, his courage failed, and he returned to England, abandoning his deluded supporters in France to their fate. With the Restoration he reappeared in France, and became the head of the bigoted ultra-Royalist faction. (See Chambre Introuvable.) In the circle of Jesuits, priests, and nobles of the old school that surrounded him originated most of those extreme measures against which the better-minded Louis XVIII. (q.v.) ineffectually protested at times. The death of Louis, September 16, 1824, brought Charles to the throne. He took the oath of adherence to the charter, but soon displayed his intention of restoring the absolutism of the old French monarchy. Popular discontent rapidly increased during the succeeding five years. The King sought in vain to allay it by embarking the nation in a military enterprise, the expedition against Algiers, undertaken in 1830. In March, 1830, Charles adjourned the chambers on account of an address of remonstrance in reply to a royal speech. In May the Chamber of Deputies was dissolved and new elections were ordered. The deputies who signed the address were reëlected. On July 25 the celebrated ordinances were signed putting an end to the freedom of the press, already largely curtailed, decreeing a new mode of election, and dissolving the recently elected Chamber. The people of Paris took up arms, and the revolution of July 27-29 overthrew the Bourbon monarchs. As a last resource Charles abdicated the throne, August 2, 1830, in favor of his grandson, Henry, Duke of Bordeaux. It was too late, however, as the revolution was accomplished, and Louis Philippe, Duke of Orléans, was chosen King of the French. Charles made his escape to England, resided for some time at Holyrood, and afterwards at Prague. He took no part in the political intrigues and attempts of the Duchess of Berry. He died of cholera at Görz, November 6, 1836. Charles X. was a characteristic example of that type of Bourbons who "never learn anything and never forget anything."

CHARLES III. (1345-86). King of Naples from 1381 to 1386, also known as Charles of Durazzo and Charles II. of Hungary. His father, Louis of Gravina, died in prison, having rebelled against Joanna I. of Naples. The Queen adopted Charles, but afterwards abandoned him in favor of Louis I. of Anjou. Charles descended into Italy, at the invitation of Pope Urban VI., and seized the crown of Naples (1381), causing Joanna to be strangled in prison (1382). Louis of Anjou contested the throne, and Charles had to wage war with his rival, who died in 1384. He was invited to accept the crown of Hungary by a party dissatisfied with the rule of Queen Elizabeth and her daughter, and was crowned at the close of the year 1385; but soon a revolt was incited against the Italians, and Charles was poisoned in prison.

CHARLES II. (1332-87). King of Navarre, known as The Bad. He was the son of Philip of Evreux and of Joanna, the daughter of the French King, Louis X. He became King of Navarre in 1349 on the death of his mother, and in 1352 married Joanna, the daughter of John II. of France. Between the two rulers an implacable hatred prevailed, resulting in great misfortunes to France. In 1354 John confiscated the extensive possessions of the King of Navarre in Normandy, and in revenge Charles formed an alliance with the English and made preparations for the invasion of France. The two kings, however, became reconciled; Charles's territories were restored to him and in 1355 he was in Paris, ostensibly on terms of friendship with the King, but in reality plotting with the nobles against him. As a result he was thrown into prison and was not freed until November, 1357. In the same year he was in Paris, at peace with the Dauphin, and enjoying great popularity with the bourgeoisie. As a champion of the people he sided with Etienne Marcel (q.v.) in the revolt of Paris against the royal authority, and in June, 1358, was made captain of the city. His perfidiousness and cruelty, however, in repressing Jacquerie destroyed his popularity, and after playing fast and loose with the Dauphin and the English he formed an alliance with the latter and ravaged Northern France for more than a year, till bought off in 1359. After 1362 his importance in French politics waned, but he found sufficient scope for the exercise of his talent for duplicity in the complicated politics of the Iberian Peninsula. In 1378 Charles V. of France deprived him of his possessions in that country while a Castilian army invaded Navarre. With the aid of the English, however, he succeeded in warding off the danger on the side of Castile. He died on January 1, 1387. Charles was possessed of great political genius and fine oratorical gifts; but he was mercenary, cruel, and perfectly unscrupulous in the attainment of his ends. He was twice accused of attempting to poison the French King, not without sufficient evidence.

CHARLES I. (1863—). King of Portugal since 1889. The son of Luiz I. and of Maria Pia, the daughter of Victor Emmanuel II. of Italy, he was born September 28, 1863. He succeeded to the throne October 19, 1889. He married, in 1886, Marie Amélie, the daughter of the Comte de Paris. Of this union came two sons, Luiz Philippe, Duke of Braganza, born March 21, 1887, and Manoel, born November 15, 1889. His reign has witnessed the rise of a strong radical party in Portugal, traceable in great measure to the financial difficulties under which the country labored during the last decade of the Nineteenth Century. In international affairs the political status of Portugal has been enhanced by the growth of European colonization in Africa and the increased importance of its possessions in that continent, especially in East Africa.

CHARLES I. (1839—). King of Rumania. He was born April 20, 1839, the second son of Prince Karl Anton of Hohenzollern-Sigmaringen. He served in the Prussian Army, and after the dethronement of Alexander John (Cuza) was elected Prince of Rumania, April 20, 1866, and arrived in the capital, Bucharest, in May. The country was in a wretched condition, the prey of rival factions and foreign intrigues. The new Prince showed tact and statesmanship in the work of reorganization. At the outbreak of the Russo-Turkish War (q.v.), in 1877, the Rumanian army was mobilized, an alliance was concluded with Russia, and Prince Charles took the command in person. The army was kept in Rumanian territory for some weeks, after the opening of the campaign, because of Austrian jealousy of military activity on the part of her Balkan neighbors. Prince Charles took the field with his Rumanians, however, when an attack on Plevna had been opened, and rendered valuable assistance in the hardest fighting of the war. A few weeks after the beginning of the war Rumania declared her independence (May 21). In 1881 Rumania assumed the title of kingdom, and on May 22 Charles was crowned as King at Bucharest. Under him the internal development of the country has gone actively forward, education has advanced, and a safe course has been steered in the difficult politics of southeastern Europe. Charles married Princess Elizabeth von Wied (known by her pen-name Carmen Sylva), November 15, 1869. The succession, in case of his dying childless, was settled upon his elder brother, Leopold, who renounced the claim in favor of his son, Ferdinand. Consult Whitman, *Reminiscences of the King of Rumania* (London, 1899).

CHARLES I. King of Spain. See Charles V., Holy Roman Emperor.

CHARLES II. (1661-1700). King of Spain from 1665 to 1700. He was the son of Philip IV., and was but four years old when his father died, the regency being in the hands of the Queen-mother, Maria Anna of Austria. During her rule Spain was much weakened by an unsuccessful war with France, and by the loss of Sicily. In 1675 Charles assumed the government, taking for his chief adviser Don John, an illegitimate son of the late King, who was a man of ability. By marrying Louise of Orléans, a niece of Louis XIV., Charles maintained harmony with France for several years. After her death Charles married a sister of the Emperor Leopold I. He joined the Grand Alliance in the war against Louis XIV., which was concluded by the Peace of Ryswick (1697). Charles was childless, and was prevailed upon to appoint as his successor Philip of Anjou, grandson of Louis XIV. On his death, November 1, 1700, the claim of Philip of Anjou was contested and the War of the Spanish Succession ensued. See SUCCESSION WARS; CHARLES VI; LOUIS XIV.

CHARLES III. (1716-88). King of Spain from 1759 to 1788. He was the second son of Philip V., and great-grandson of Louis XIV. of France. Parma and Piacenza were obtained for him when he was only fifteen to satisfy the ambition of his mother, Elizabeth Farnese. In 1734 he invaded the Two Sicilies, then belonging to Austria, and completed their conquest in 1735, when he was crowned King as Charles III., the Emperor Charles VI. being forced to recognize his title in the treaties of Vienna (1735, 1738). On the death of his brother, Ferdinand VI., in 1759, Charles succeeded to the Spanish throne. He was a man of ability and liberal ideas, and effected many reforms, especially in financial administration. The Jesuits were banished in 1767 and an effort was made to bring the Inquisition under the control of the civil power. Charles endeavored to put a stop to brigandage and to Algerine piracy, and interested himself in the development of commerce and the arts and sciences. He was an ally of France in the Seven Years' War, and in 1763 was compelled to cede Florida to England, Louisiana being made over to Spain by France. At the close of the American War of Independence Florida was restored to Spain. Unsuccessful attempts were made in 1781 and 1782 to take Gibraltar from the English. Charles died in Madrid, December 14, 1788. Consult: Colletta, *History of the Kingdom of Naples, 1734-1825*, translated by Horner (Edinburgh, 1858); Armstrong, *Elizabeth Farnese* (London, 1892); Danvila, *Historia general de España*, published under the direction of Cánovas del Castillo (Madrid, 1892).

CHARLES IV. (1748-1819). King of Spain from 1788 to 1808. He was the son and successor of Charles III., and was born in Naples, November 12, 1748. When very young, Charles married his cousin, Maria Louisa, of Parma, who soon acquired great influence over him. The government was conducted chiefly by Godoy (q.v.), a handsome but dissolute guardsman and a favorite of the Queen, who was made Duke of Alcudia, and Minister of Foreign Affairs. Peace with the French Republic was concluded in 1795, after a disastrous war, undertaken at the instance of Godoy. Soon after this peace an offensive and defensive alliance was made with France, and Spain speedily became involved in war with Portugal and also with England, the main event of which was the destruction of the Spanish fleet by Nelson at Trafalgar in 1805. In 1807 Charles made a secret treaty with Napoleon according to which Portugal was to be seized by the French and Spanish, and the greater part to be divided between Godoy and the Infanta Maria Louisa, Queen of Etruria, while Charles was to assume the title of Emperor of America; at the same time 16,000 Spanish troops were to be sent to the assistance of the French in Denmark. Meanwhile, Napoleon was intriguing with Don Ferdinand, the heir to the throne. On March 19, 1808, Charles, alarmed by disturbances in Madrid, abdicated in Ferdinand's favor. He declared immediately that this act was not voluntary. In a meeting with Napoleon at Bayonne, Charles surrendered the crown on May 5, 1808, to the French Emperor, who gave him a pension of 6,000,000 francs, and the castle and grounds of Chambord. He died January 19, 1819, in Rome. See GODOY; SPAIN.

CHARLES IX. (1550-1611). King of Sweden from 1604 to 1611. He was the third son of Gustavus Vasa, and in 1560 became Duke of Södermanland. In 1592 he became regent of the kingdom after the death of his father, John, and as such favored the introduction of the Reformed religion into Sweden. In 1593 he secured the adoption of the Augsburg creed as the basis of the national religion, and he confirmed the position of Protestantism by his victory at Staongebro in 1598 over his nephew, Sigismund of Poland, who was rightful King of Sweden, but who, as a decided partisan of Catholicism, was objectionable to the mass of the people. After many attempts at compromise, Sigismund was formally deposed in 1399 and Charles was made regent. He ascended the throne in 1604. He engaged in wars with Poland, Russia, and Denmark, but his people did not share his ambitions and denied him the support he desired. Charles founded the University of Gothenburg and made a new code of laws. He wrote a rhymed chronicle of the war with Poland.

CHARLES X. GUSTAVUS (1622-60). King of Sweden from 1654 to 1660. He was born at Nyköping, November 8, 1622, the son of Catharine, eldest sister of Gustavus Adolphus, and of John Casimir, Count Palatine of Zweibrücken (Deux Ponts). After studying at the University of Upsala, he traveled through France, Germany, and Switzerland, and joined the army of Torstenson (q.v.) in 1642. He fought at the battles of Jankau and Leipzig, and at the close of the Thirty Years' War was the representative of Queen Christina at the conference held subsequent to the Treaty of Westphalia. On the abdication of Christina he succeeded, June 16, 1654, to the throne of a kingdom in an almost bankrupt condition. In 1655 Charles invaded Poland, whose King, John Casimir, indulged in pretensions to the Swedish Crown, compelled the Elector of Brandenburg, Frederick William, to enter into an alliance with him, defeated the Polish army in a great battle at Warsaw (July 28-30, 1656) and overran the country, but retired when Russia and Austria prepared to assist the Poles, while the King of Denmark invaded the Swedish territories in Germany. He attacked Denmark in 1658, crossing the Little Belt on the ice, and secured for Sweden the provinces of Scania, Halland, and Bleking. Renewing the war in the same year, Charles laid siege to Copenhagen. The Dutch came to the assistance of the Danes and defeated the Swedish fleet, and in 1659 Charles had to abandon the siege. At the same time his forces were defeated in Pomerania by the Elector of Brandenburg, who had turned against him. Charles died in Gothenburg, February 13, 1660. Consult Geijer und Carlson, *Geschichte Schwedens*, Vol. IV. (Gotha, 1855-75).

CHARLES XI. (1655-97). King of Sweden from 1660 to 1697. He was the son of Charles X. and Hedwig Eleonora of Holstein, and was born November 24, 1655. During his minority the government was intrusted to his mother, Hedwig, as regent. By the Peace of Oliva (May 3, 1660) with Poland, Sweden obtained Esthonia, part of Livonia, and Oesel, and the Polish monarch renounced all pretensions to the Swedish crown; that of Copenhagen (June 6, 1660) was generally confirmatory of the treaty of Roeskilde with Denmark in 1658. (See Charles X.) A treaty with Russia on the basis of the status quo followed in 1661; and from this period till 1672 the kingdom was free from foreign wars, but it was misgoverned by the regency and the education of the young King was neglected, willfully, it is charged, in order that he might longer be kept in leading-strings. Until he reached manhood he could neither read nor write. In December, 1672, Charles assumed the reins of government. In 1674 he was called upon by Louis XIV., under a treaty made by the regency, to engage in the war of France on the German princes and Holland. The Swedes invaded Brandenburg and met a severe defeat at Fehrbellin in 1675. Charles, however, overthrew the Danes, who were allies of Brandenburg, at Halmstadt, Lund, and Landskrona, but his fleet was defeated by the Dutch near Oeland, and again by the Danes at Blekinge and Kiöge; and many of Sweden's recent acquisitions were wrested from her. These, however, were restored by the peace of Saint-Germain-en-Laye (September 17, 1679). Charles now entered upon an active period of reform in the administration, aided by his most trusted counselor, John Gyllenstern. In 1680 a struggle commenced between the Crown, supported by the burghers and peasants, on the one hand, and the nobles on the other; and a considerable diminution of the power of the nobles was the consequence. The resumption of all the Crown lands which had been alienated since 1609 was a fatal blow to the power of the nobles, and by a voluntary declaration of the estates, December 9, 1682, the King was invested with absolute authority. By a judicious administration of the revenues, Charles was enabled to extinguish the public debt, reorganize the fleet and army, and by 1693 to dispense with extraordinary subsidies. Though absolute, he never imposed a tax but with the consent of the estates; and he published every year a detailed account of revenue and expenditure. He established the finances on a sound basis and brought the army and navy of the kingdom to a state of high efficiency. The codification of the laws was commenced, but was unfinished at his death, which took place in Stockholm, April 15, 1697. Consult Geijer and Carlson, *Geschichte Schwedens*, Vols. IV.-V. (Gotha, 1855-75).

CHARLES XII. (1682-1718). King of Sweden from 1697 to 1718. He was the eldest son of Charles XI. and of Ulrica Eleonora of Denmark, and was born in Stockholm, June 27, 1682. His youth gave no promise, either of ability or purpose befitting a sovereign, but he showed his mettle when Sweden, soon after his accession, was threatened by a coalition of Frederick IV. of Denmark, Augustus the Strong, Elector of Saxony and King of Poland, and Peter of Russia, who was yet to win his title of 'the Great.' Sweden had been for seventy years one of the great powers of Europe, as a result of the policy of the kings of the house of Vasa (q.v.); it possessed territory all about the Baltic, and its troops were reputed the best in Europe. The War of the North that was now brought on by the coalition was at first on Sweden's part a war of defense; then, through the successes of Charles, a war of aggression and conquest, and finally, through his failure, a struggle for existence. Its story is a mingling of brilliant triumph and disheartening defeat, both resulting from the meteoric and ill-balanced genius, reckless ambition, and fatal obstinacy of the Swedish King, qualities that have won for him in history the name of 'Madman of the North.' He was a born soldier, and had taken Alexander the Great for his favorite hero. He was fond of all daring sports, careless of exposure, and unsparing of himself and others. When intelligence of the hostile league that threatened him reached Stockholm, the young King surprised every one around him by the energy and efficiency he displayed. Frederick IV. of Denmark had invaded Schleswig-Holstein, whose Duke, a brother-in-law of the Swedish King, had called the latter to his assistance. In a six weeks' campaign Denmark was brought to terms and Frederick signed the Peace of Travendal on August 8, 1700. Charles now turned promptly to the defense of the Swedish possessions on the Baltic menaced by Russia and Poland. Russia sought to obtain the Swedish provinces of Ingria and Carelia, while Livonia and Esthonia, whose nobility detested the firm and often severe rule of Sweden, wished to put themselves under the weaker Polish monarchy. Hastening toward Riga, Charles compelled the Poles to raise the siege of that place, and then by forced marches brought his army of a little over 8000 men to the relief of Narva in Esthonia, which was beleaguered by 40,000 Russians, while Peter himself had gone to hasten the advance of 20,000 more. The disciplined Swedish troops, although jaded by forced marches, administered a severe defeat to the Russians before the walls of the city (November 30, 1700), and Europe expected to see the whole Russian Empire brought under the sway of the young Swede who seemed to have revived the martial glory of the great Gustavus. Unfortunately for Charles, he seems to have entertained the same mad dream of conquest. Only the astute Peter looked the situation squarely in the face and sought to learn its lesson for Russia. He strengthened his alliance with Augustus of Poland, and at Birsen in February, 1701, it was agreed that Augustus should occupy the attention of the Swedes in the west and Peter in the east, and that they should divide the Baltic provinces. The war thus opened in Denmark and the Baltic provinces involved the control of the Baltic and lasted for twenty-one years, ending in the marked diminution of the power of Sweden and the rise of Russia as the great Baltic power. Its first years, however, pointed to no such result. Influenced by the advice of his generals, Charles did not follow up his success against Peter, who was really his dangerous antagonist, but sought the overthrow of the King of Poland, while Peter was left to develop his resources. The conquest of Poland was accomplished, owing to the chronic disagreements among the nobility in that unfortunate country, but five years were necessary for its completion. The country was overrun by the Swedish troops, Augustus was finally driven into Saxony, and Charles, who had determined, against the advice of his principal counselor, Piper, to accomplish his enemy's dethronement, secured the election of Stanislas Leszczynski, who was crowned in Warsaw, in October, 1705. Meanwhile the Czar had been engaged in the conquest of the Baltic provinces and had been preparing for the ultimate contest with Charles. The latter now carried the war into Saxony, marching through Silesia and posing as the protector of the Protestants. Seeing his hereditary dominions in danger, Augustus sued for peace. Charles exacted from him in the Treaty of Altranstädt (1706) a renunciation of the Polish crown and of all alliances, the recognition of Stanislas, and the delivery to Charles of Patkul, the head of the Livonian malcontents, who had been instrumental in bringing about the coalition between Augustus and Peter. Patkul was executed as a traitor. Charles was now at the height of his power, with a disciplined army of 40,000 men, stationed near Leipzig, holding Germany in awe. If his military ability had been seconded by moderate and wise statesmanship he might have made himself the most powerful sovereign of Europe. France hoped that he might attack the Grand Alliance, and the members of the Alliance feared it, but after exacting humiliating terms from the Emperor Joseph I. Charles turned his face eastward to reconquer the Baltic provinces, and then to conquer Russia and perhaps Asia. He entered upon this daring plan with about 46,000 men. The tactics of the Russians were those afterwards employed to defeat Napoleon. Charles was lured on into the interior of Russia, his army harassed on the way, and finally on July 8, 1709, while besieging Poltava, on the border of the Ukraine, he was attacked by the Russian army in force and the entire fabric of his military success was shattered in one disastrous engagement. His army was annihilated and he himself barely escaped into Turkish territory, with 300 of his guard. He prevailed upon the Sultan to take up arms against Russia, and in 1711 Peter the Great found himself in a most precarious position on the banks of the Pruth. He was permitted, however, to escape, and the treaty which he was forced to conclude with the Turks was of no benefit to Charles. The Swedish monarch spent the next three years in semi-captivity among the Turks, engaged in fruitless intrigues to induce the Ottoman Government to attack Russia. Had he at once returned to his kingdom and turned his real abilities to good use for the State, the history of Sweden might have been different. Instead, with an obstinacy that was simply madness, he wasted his time in this scheme for revenge. When he found that his plots were of no avail he defied the Turkish power, was made a prisoner, but escaped in 1714, and, dashing on horseback disguised through Hungary and Germany, reached Stralsund, which was at once invested by a combined force of Danes, Prussians, and Saxons, and after a year's siege compelled to surrender. The King was wounded in the siege. After driving the Danes from Scania, he invaded Norway and was killed by a cannon-ball while besieging Frederikshald, December 11, 1718. In private life Charles was almost an ascetic. See SWEDEN; PETER I.; RUSSIA; POLAND.

BIBLIOGRAPHY. There are valuable Swedish works relating to this reign: Axelson, *Bidrag till kännedomen om Sveriges tillstand pa Karl XII:s tid* ("Contribution to the Knowledge of the Condition of Sweden in the Time of Charles XII.") (Wisby, 1888); E. Carlsen (ed.), *Karl XII:s egenhändiga bref* ("Autograph Letters of Charles XII.") (Stockholm, 1893); Carlson, *Sveriges historia under konungarne af det pfalziska huset* ("History of Sweden Under the Kings of the Palatine House") (Stockholm, 1855-81), also in German abridgment (Gotha, 1887). Consult, also, Voltaire, *Histoire de Charles XII.* (Rouen, 1730), which cites much valuable contemporary evidence. A very full bibliography may be found in Lavisse and Rambaud, *Histoire générale*, Vol. VI. (Paris, 1896). This work also contains an admirable account of the struggle for the Baltic.

CHARLES XIII. (1748-1818). King of Sweden from 1809 to 1818. He was the son of King Adolphus Frederic. As high admiral of Sweden, he distinguished himself by winning a notable victory over the Russians in the Gulf of Finland in 1788. He also rendered important political and diplomatic services to his brother, Gustavus III., who created him Duke of Södermanland. After the assassination of Gustavus III. in 1792, Charles assumed the regency for Gustavus IV. Adolphus, and held it until 1796. In 1809, when at a critical juncture Gustavus had proved unequal to the situation, Charles was made administrator of the kingdom. A few months later Gustavus was deposed and Charles accepted the kingship, under a constitution adopted by the Diet. He cultivated friendship with Russia and England. In 1814 the union of Norway and Sweden under one sovereign was effected. He died February 5, 1818. See SWEDEN.

CHARLES XIV. JOHN (1764-1844). King of Sweden and Norway from 1818 to 1844, and before his elevation to the throne General Jean Baptiste Jules Bernadotte, a celebrated marshal of Napoleon. He was born in Pau, France, January 26, 1764, the son of a French lawyer. He fought in the Revolutionary wars (from 1794 as general of division) in Belgium, Germany, and Italy, and in 1799, in the last year of the Directory, was Minister of War. In 1800 he suppressed a rising of the Chouans, and in 1804 Napoleon created him marshal. He bore a distinguished part in the victory of Austerlitz in 1805, for which he was made Prince of Pontecorvo, and won fresh laurels in the campaign against the Prussians in 1806-07 and at Wagram in 1809. He was never one of the personal following of Napoleon, who appears to have been jealous of the general. He was chosen by the Swedish Diet in 1810 Crown Prince and successor of Charles XIII. (q.v.). The only condition of moment was that he should become a Protestant. Bernadotte agreed, changed his name to Charles John, and soon began to exercise many of the royal functions. The Crown Prince resisted the efforts of Napoleon to involve Sweden in his designs against England. The country was soon engaged in war with France, and at the head of the northern troops Prince Charles joined the Allies in the final struggle with Napoleon, and contributed to the victory of Leipzig (October, 1813). He forced Denmark in the Treaty of Kiel to give up Norway, and conducted the campaign for its subjugation (1814). Charles XIII. died in 1818, and was succeeded by Prince Charles John as Charles XIV. John. The period of his administration was characterized by progress in all directions, both public and private. Charles was the only one of Napoleon's generals who founded a permanent dynasty. He died March 8, 1844. The present royal house of Sweden and Norway is descended from Bernadotte, but intermarriage with Germans has made it thoroughly Teutonic. See SWEDEN. Consult: Meredith, *Memorials of Charles John, King of Sweden and Norway* (London, 1829); Sarrans, *Histoire de Bernadotte, Charles XIV. Jean* (Paris, 1845); *Recueil des lettres, discours et proclamations de Charles XIV. Jean* (Stockholm, 1858).

CHARLES XV. (1826-72). King of Sweden and Norway from 1859 to 1872. He succeeded his father, Oscar I., who was a son of Charles XIV. John (q.v.). The rule of Charles was liberal and popular. The most important event was the change (in 1866) in the constitution of the Parliament, which has since consisted of two chambers, one elected by the provincial representatives and the other by the people. He had a taste for literature and art, and published a volume of poems. In 1850 he married Louisa, daughter of the King of the Netherlands, by whom he had one daughter, who became the wife of Prince Frederick of Denmark. He died September 18, 1872.

CHARLES THE BOLD (translation of Fr. *Charles le Téméraire*) (1433-77). The last Duke of Burgundy. He was the son of Philip the Good, of the House of Valois, and of Isabella of Portugal, and was born in Dijon, November 10, 1433. During his father's life he bore the title of Count of Charolais. He was of a fiery, ambitious, and violent disposition. From an early period to the end of his life he was a declared enemy of Louis XI. of France, the nominal feudal superior of Burgundy, and when Louis caused Philip to deliver up some towns on the Somme, Charles left his father's Court and formed an alliance with the Duke of Brittany and some of the great nobles of France for the maintenance of feudal rights against the Crown. Their forces ravaged Picardy and Ile-de-France, threatened Paris, and defeated the King at Montlhéry (1465). The result was a treaty by which the Count of Charolais obtained the towns on the Somme and the counties of Boulogne, Guines, and Ponthieu for himself. In 1467 he succeeded his father as Duke of Burgundy. The Burgundian realm comprised Flanders, Brabant, and nearly all the rest of the Netherlands, in addition to Burgundy and Franche-Comté. Richer and more powerful than any other prince of his time, Charles the Bold conceived the design of restoring the old kingdom of Burgundy, which involved the conquest of Lorraine, Provence, Dauphiny, and part of Switzerland. War raged between him and France afterwards with but little intermission till 1475. In September of that year Charles found himself at leisure to attempt the prosecution of his favorite scheme of conquest, and soon made himself master of Lorraine. In the following year he invaded Switzerland, stormed Granson, but was soon after terribly defeated by the Swiss near that place, and lost his baggage and much treasure. Three months later he appeared again in Switzerland with a new army of 60,000 men, and laid siege to Morat, where he sustained in June, 1476, another and still more overwhelming defeat. Nevertheless he refused to listen to terms and laid siege to Nancy in the fall of 1476. His army was small, and in a battle fought on January 5, 1477, before that town, he was overwhelmed by René of Lorraine and his Swiss mercenaries, and lost his life. His daughter and heiress, Mary, married the Emperor Maximilian I. With his life ended the long resistance of the great French vassals to the power of the centralized monarchy. Consult Kirk, *History of Charles the Bold* (3 vols., Philadelphia, 1864-68).

CHARLES, LOUIS JOHN (1771-1847). Archduke of Austria. He was the third son of the Emperor Leopold II. and was born in Florence, September 5, 1771. He pursued his military studies with much ardor; and, having displayed great ability in inferior commands in the battles of Jemmapes, Neerwinden, and Wattignies, was intrusted, in 1796, with the chief command of the Austrian Army of the Rhine. After inflicting repeated defeats upon Moreau, Jourdan, and Bernadotte, he drove the French across the Rhine and captured the stronghold of Kehl, January 10, 1797. In 1799 he was again at the head of the Army of the Rhine, was several times victorious over Jourdan, protected Suabia, and succesfully opposed Masséna, but suffered defeat at Zürich, June 4. In 1800 bad health compelled him to retire from active service; but being appointed Governor-General of Bohemia, he formed a new army there. After the battle of Hohenlinden (1800) he was again called to the chief command, and succeeded in staying the rapid progress of Moreau, but almost immediately entered into an armistice with him, which was followed by the peace of Lunéville. In 1805 he commanded the army opposed to Masséna in Italy, and fought the hard battle of Caldiero; but upon bad tidings from Germany, retreated from the left bank of the Adige to Croatia. This retreat was one of his greatest military achievements. Made generalissimo of the Austrian forces, he won, in 1809, the great battle of Aspern (q.v.), which first showed Europe that Napoleon was not invincible; but he did not promptly enough follow up his victory, and Napoleon, who hastened to reinforce his army, retrieved his fortunes at Wagram. The Archduke was now compelled to give way before the enemy, till he reached Znaim, where an armistice was concluded on July 12th. In the campaigns of 1813 and 1814 he had no part. He lived in retirement till his death, which occurred April 30, 1847. He was author of *Grundsätze der Strategie* (1814). Consult: Duller, *Erzherzog Karl* (Vienna, 1844-45); Zeissberg, *Erzherzog Karl* (Vienna, 1895).

CHARLES, ELIZABETH RUNDLE (1826-96). An English religious novelist, the wife of Andrew P. Charles, of London. She wrote *Chronicles of the Schönberg-Cotta Family* (1863), a story of the German Reformation; *Diary of Mrs. Kitty Trevelyan* (1864); and other popular works of fiction.

CHARLES, shärl, JACQUES ALEXANDRE CÉSAR (1746-1822). A French physicist and aëronaut noted for skill in experiments and public demonstrations. He made the first balloon (Charlière) filled with hydrogen gas, and on December 1, 1783, made a successful ascent to the height of 7000 feet. He invented a thermometric hydrometer and a number of optical instruments.

CHARLES, R. H. (1855—). A British divine and author. He was born in County Tyrone, Ireland, and was educated at Queen's College, Belfast, Trinity College, Dublin, and Queen's University. He was curate of Saint Mark's, Whitechapel, from 1883 to 1885, of Saint Philip's from 1885 to 1886, and of Saint Mark's, Kensington, from 1886 to 1889. Among his numerous publications may be mentioned: *Book of Enoch* (translated from the Ethiopic, 1893); *Ethiopic Text of the Book of Jubilees* (edited from four MSS., 1894); *Book of the Secrets of Enoch* (1895): *Apocalypse of Baruch* (translated from the Syriac, 1896); *Jowett Lectures for 1898-99.*

CHARLES AL'BERT (1798-1849). King of Sardinia from 1831 to 1849. He was the son of Prince Charles Emmanuel of Savoy-Carignan, and in 1800 succeeded to his father's title and estates in France and Piedmont. In 1817 he married Maria Theresa, daughter of the Archduke Ferdinand of Tuscany. On the outbreak of the revolutionary movement in Piedmont in 1821, he was made regent upon the abdication of Victor Emmanuel I., until Charles Felix, the brother of the late King, should arrive to assume the sovereignty. He displeased, during his short reign of a week, both the Liberal Party and its opponents, and Charles Felix disavowed all his acts, and for some time forbade his appearance at Court. In 1829, however, he was appointed Viceroy of Sardinia. On the death of Charles Felix, April 27, 1831, he ascended the throne. Under the impulse of the movements of 1848, Charles Albert granted to Sardinia a constitution, the *Statuto*, which became the constitutional basis of the new Italy (see CAVOUR). The King entered warmly into the project of Italian unity, and evidently expected to place himself at the head of the whole movement and of the new kingdom of Italy. He was not, however, in real sympathy with the democracy of the new liberalism, and he was too visionary and unpractical to lead Sardinia along the difficult road that lay before her. When the Lombards and Venetians rose against the Austrian Government, he declared war against Austria, March 23, 1848, and at first was successful; but his army was deficient in organization and leadership, and at Custozza, July 25, 1848, and at Novara, March 23, 1849, his hopes were wrecked by crushing defeats at the hands of the Austrians. On the battlefield of Novara he resigned the crown in favor of his son, Victor Emmanuel. He retired to Portugal, and died in Oporto on the 28th of July of the same year. See ITALY; SARDINIA; SAVOY, HOUSE OF.

CHARLES AUGUS'TUS (1757 - 1828). Grand Duke of Saxe-Weimar. He lost his father in the first year of his life, and, together with a posthumous brother, was educated with great care during the regency of his mother, a woman of liberal ideas and great strength of character. Wieland, Knebel, and other prominent men were among the teachers of young Charles Augustus. In December, 1774, he made the acquaintance of Goethe, and they at once became friends. As soon as Charles Augustus assumed the reigns of government, on his eighteenth birthday, he called Goethe to Weimar, and their intimacy was interrupted only by death. Owing to his own love of letters and the influence of his mother, Amalie (q.v.), the Court of Saxe-Weimar became the shrine of German literature. Schiller, Herder, Wieland, and others lived under Augustus's protection, and the Court Theatre at Weimar witnessed the first production of *Iphigenie* (1786) and *Tasso* (1789). In 1786 Charles Augustus entered the Prussian Army, in which he remained until the defeat at Jena in 1806, when he joined the Rhenish Confederacy and aided the French. In 1813 he joined in the coalition against Napoleon, and commanded an army of Saxons, Hessians, and Russians. He fought among the Allies in 1815, and the Congress of Vienna rewarded his services by enlarging his principality and making it a grand duchy. Consult Düntzer, *Goethe und Karl August* (2d ed. Leipzig, 1888).

CHARLES DE BLOIS, shärl de blwä, or **DE CHATILLON** (? -1364). A claimant to the Duchy of Brittany. He was a nephew of Philip VI. of France, and became involved in a struggle with Jean de Montfort for the possession of the duchy. He was killed at the battle of Auray.

CHARLES EDWARD. See STUART, CHARLES EDWARD.

CHARLES EMMAN'UEL I., Duke of Savoy. (1580-1630). See SAVOY, HOUSE OF.

CHARLES FRED'ERICK AUGUS'TUS WIL'LIAM (1804-73). Duke of Brunswick, son of Duke Frederick William, who fell at the battle of Quatre-Bras. He was born in the Duchy of Brunswick and after his father's death was put under the care of King George IV. of England. He ascended the ducal throne in 1823, but his administration was intolerable, and he was expelled by his subjects in 1830. The remainder of his life he passed chiefly in London, Paris, and Geneva, and at his death he bequeathed his immense fortune to the last-named city.

CHARLES GRAN'DISON, THE HISTORY OF SIR. A novel by Samuel Richardson (1753), depicting the author's ideal of a faultless hero.

CHARLES MARTEL' (Fr., Charles the Hammer) (689-741). Mayor of the Palace under the last Merovingian kings, and the son of Pepin of Heristal. After his father's death in 714 he was proclaimed Mayor of the Palace by the Austrasians. A war between Austrasia and Neustria followed, which ended in Charles becoming undisputed ruler of all the Franks, the titular kings being mere puppets in his hands. He was engaged in long wars against the revolted Alemanni, Bavarians, and against the Saxons, but his importance as a historic personage is chiefly due to his wars against the Saracens, who, having conquered Septimania from the Visigoths, in 720, advanced into Aquitaine, conquered Bordeaux, defeated the Duke of Aquitaine, crossed the Garonne, advanced to the Loire, and threatened Tours. Charles overthrew them near Poitiers, in 732, in a great battle, in which their leader, Abd-er-Rahman, fell, and their progress, which had filled all Christendom with alarm, was checked for a time. He defeated them again in 738, when they had advanced into the Burgundian territories as far as Lyons, deprived them of Languedoc, which he added to the kingdom of the Franks, and left them nothing of their possessions north of the Pyrenees beyond the river Aude. Charles attempted to convert Saxony and Frisia to Christianity and gave aid to Saint Boniface (q.v.) in his missions. He died on October 22, 741, at Quiercy on the Oise, leaving the government of the kingdom to be divided between his two sons, Carloman and Pepin the Short.

CHARLES OF ANJOU, äN'zho͞o', Count of Provence and King of Naples and Sicily (1226-85). He was the seventh son of Louis VIII. of France, and wedded Beatrice, heiress of Provence. In 1248 he went on a crusade in company with his brother, Louis IX., suffered captivity in Egypt with him, and returned to Provence in 1250. Exceedingly ambitious, he sought everywhere for opportunities to increase his possessions. For aid rendered Margaret of Flanders (q.v.), he was promised the Province of Hainaut; but Louis interfered and Charles was compelled to relinquish Hainaut for a large sum of money. In 1262 Pope Urban IV. invited Charles to assume the crown of the Two Sicilies, and to assist in the overthrow of the bastard Manfred, the Ghibelline King. In 1263 Charles was made Senator of Rome, and in 1266 was crowned King of the Two Sicilies. A crusade was preached against Manfred, who was overwhelmed and slain in the battle of Benevento. In 1268 the young Conradin, the legitimate heir, was defeated at Tagliacozzo, captured, and executed; a like fate was dealt out to many Italian nobles; estates were confiscated to reward the French mercenaries, and Charles established himself firmly in power. In 1270 Charles participated in the disastrous crusade of his brother, Louis IX., and later (1282), when he was preparing for another expedition, news was brought of the rebellion afterwards known as the Sicilian Vespers (q.v.). Charles at once sent his fleet against Messina, refusing all offers of capitulation; but the city held out until assistance came from Don Pedro of Aragon, and Charles's fleet was burned. In 1285 the King died at Poggio. Charles of Anjou was one of the most powerful rulers of his time in Christendom. He was all-powerful in the councils of France; ruled over Anjou, Provence, and the Two Sicilies; was Senator of Rome, Imperial Vicar of Tuscany, Governor of Bologna, and lord of several other cities; he had also bought the rights to the kingdom of Jerusalem. Consult: Sternfeld, *Karl von Anjou* (Berlin, 1888), which treats of Charles's career up to 1265; *Archivio storico Italiano*, 3d series, Vols. XXII.-XXVI. (Florence, 1875-77); id., 4th series, Vols. I.-VII. (Florence, 1878-81).

CHARLES OF ORLÉANS, ôr'lā'äN' (1391-1465). A French poet and nobleman, the son of Duke Louis of Orléans. He was brought up at the Court of Blois, and upon the death of his father (who was murdered by the Burgundians and Valentino of Milan) succeeded to his estates. At the battle of Agincourt (1415) he was taken prisoner. He was never in close imprisonment, but it was nearly twenty-five years before he was ransomed and returned to Blois. Here he gathered about him the literary people of the day. Villon joined in the poetical competitions he held at his Court. But Charles was not the rival of Villon; he was the last of the mediæval poets—Villon is modern. His favorite subjects were Love and Spring, and on these two themes he composed many rondels, one of which is the charming *Le temps a laissé son manteau*, so often introduced into anthologies. Saintsbury says of him: "Few early poets are better known than Charles of Orléans, and few deserve their popularity better." His son afterwards became Louis XII. of France. The best edition of his works is that by Héricault (1874).

CHARLES CITY. The county-seat of Floyd County, Iowa, 140 miles northwest of Dubuque, on Cedar River, and on the Illinois Central and the Chicago, Milwaukee and Saint Paul railroads (Map: Iowa, E 1). It has good water-power, and manufactures store fixtures, wood furnishings, furniture, sashes and doors, harrows, wagons, and carriages. The city has an opera-house and a large park, and is the seat of Charles City College (Methodist Episcopal), organized in 1891. Settled in 1856, Charles City was incorporated in 1869 under a general law, and is governed by a mayor, elected every two years, and a city council. The water-works are owned and operated by the municipality. Population, in 1890, 2802; in 1900, 4227.

CHARLES RIVER. A river of eastern Massachusetts (Map: Massachusetts, E 3). It rises in the western part of Norfolk County in a number of small headstreams which connect small lakes, and, pursuing a zigzag northeasterly course, empties into Boston Harbor. In the middle and lower parts of its 47-mile course, the Charles is very attractive for boating excursions. The chief towns on its banks are the Newtons, Waltham, Watertown, Cambridge, Brookline, and Boston. Below Watertown the stream is tidal, and between Cambridge on one side and Boston on the other it widens into an estuary, part of which has been filled in, and is known as Back Bay.

CHARLES'S WAIN. A common name for the constellation Ursa Major (q.v.).

CHARLESTON, chärlz'ton. A city and county-seat of Coles County, Ill., 48 miles west of Terre Haute, Ind., on the Cleveland, Cincinnati, Chicago and Saint Louis and the Toledo, Saint Louis and Western railroads (Map: Illinois, D 4). It is the centre of a farming district, and has manufactures of flour, brooms, stoves, and tiles. The city is the seat of the Eastern Illinois Normal School, and possesses a Carnegie free library and parks. Charleston was settled in 1830, incorporated in 1855, and at present is governed under a charter of 1870 which provides for a mayor, elected every two years, and a city council. The water-works are owned and operated by the municipality. One of the famous Lincoln-Douglas debates was held here in 1858. Population, in 1890, 4135; in 1900, 5488.

CHARLESTON. A city and county-seat of Mississippi County, Mo., 15 miles west by south of Cairo, Ill., on the Saint Louis, Iron Mountain and Southern Railroad (Map: Missouri, G 5). It is in a highly productive agricultural region, and ships grain, flour, fruits, potatoes, and live stock. The industries include flour-mills and saw-mills, stave and heading factories, and manufactures of axe-handles, boots, etc. Population, in 1890, 1381; in 1900, 1893.

CHARLESTON. A port of entry and an important commercial centre, the largest city in South Carolina and the county-seat of Charleston County (Map: South Carolina, D 4). It is seven miles from the ocean, on a low peninsula formed by the Ashley and Cooper rivers, which unite in a broad bay affording an excellent harbor, 130 miles by rail from the State capital, Columbia, and 82 miles northeast of Savannah, Ga.

Charleston is a city of great historic and scenic interest, with picturesque houses surrounded by pleasant gardens, and with some irregular and narrow streets. In the southern part of the city are White Point Garden, a finely wooded park, containing the Jasper Monument and a bust of William Gilmore Sims, and the Battery, a popular promenade commanding a view of the harbor. The corner of Broad and Meeting streets is the site of the court-house, post-office, and city hall, the last containing a collection of historic relics and portraits. Other prominent buildings are Saint Michael's Church, opened for worship in 1761, the Roman Catholic Cathedral, Saint Philip's Church (Protestant Episcopal), the custom-house of white marble, the Memminger Normal School, and the Thomson Auditorium. The city has a valuable library of 20,000 volumes (subscription) dating from the year 1748; and a number of charitable institutions, the more notable of which are the city hospital, Charleston Orphan House, Euston Home, and Home for Mothers, Widows, and Daughters of Confederate Soldiers. As an educational centre, Charleston is the seat of the College of Charleston, founded in 1785; South Carolina Medical College; South Carolina Military Academy, which became known for the part its students played in 1861 in the Civil War; Porter Military Academy; and Avery Normal Institute for colored students. The city maintains a well-equipped system of public schools, dating from 1810, and comprising primary and grammar schools, and a girls' high or normal school, in which are enrolled over 5000 pupils. About $60,000 is devoted annually to the educational department. Monuments of William Pitt and John C. Calhoun, and a bust of Henry Timrod, the poet, are among the objects of interest. Outside of the city are found several resorts attractive on account of popular amusements and for natural beauties: Chicora Park, four miles beyond the city limits on the Cooper River; Isle of Palms, north of Sullivan's Island, and directly on the ocean; Magnolia Gardens, 12 miles distant on the Ashley; and Sullivan's Island, with a fine beach for surf bathing. Magnolia Cemetery, three miles north of the City Hall, is a beautiful spot, with fine trees, shrubs, and flowering plants.

The harbor, landlocked and one of the safest on the coast, has been so improved since the construction of jetties as to admit large vessels, the depth of water on the bar at mean high water being over 29 feet. West of the channel is a lighthouse with a flashing light at an elevation of 133 feet. The harbor defenses include Fort Moultrie on Sullivan's Island—where the Federal Government, at an expenditure of over $500,000, is making extensive improvements designed to render the artillery post at that point one of the most completely equipped in the United States—and Fort Sumter. The other forts, well known in history, are now abandoned. The United States Navy Department has decided to transfer the naval station at Port Royal, S. C., to Charleston. An admirable site on the Cooper River, about seven miles from the city, has been secured, and plans requiring an outlay of several millions of dollars have been adopted for the construction of an extensive and well-appointed navy-yard.

The city has about nine miles of water-front, most of the wharves lying on the Cooper River. Good transportation facilities, by rail and water, form a feature of its equipment as a commercial centre. The Clyde Line connects Charleston with New York, Boston, and Jacksonville, and freight-steamers go to important foreign and domestic ports; the Atlantic Coast Line, Southern, and Plant System railways afford railroad communication.

In the early years of the Nineteenth Century Charleston was the chief cotton port in the United States, and down to 1860 it held third place among the cotton-receiving ports. Since the Civil War, however, the Charleston trade has developed but slowly, and during recent years the export trade has been declining. In 1901 the total exports amounted to $7,084,215, and imports to $1,477,719. Besides cotton exports (value in 1901, $6,728,665) there are large exports of rice, phosphates, fertilizers, lumber, and naval stores. The import trade has been slowly advancing and there is an important wholesale and jobbing trade with cities of the interior. Large quantities of fruit and early vegetables are shipped to Northern cities. Charleston, though known rather as a commercial centre, is the seat of considerable industrial interests, the principal of which are the manufacture of fertilizers, and cotton-compressing. There are also extensive rice-mills, carriage-factories, sash and blind factories, and manufactures of bagging, baskets, barrels, flour, lead, refined oil, beer, ice, etc.

The government is administered, under the charter of 1836, by a mayor who holds office for four years, and a city council, the members of which are elected one-half by wards, and one-half at large. The executive controls appointments to the board of health and, with the consent of the council, nominates commissioners of the city hospital, board of fire masters, commissioners of the Colonial Common, and park commissioners. All other administrative officials are elected by the municipal council. The annual expenditures of the city amount to about $600,000, the main items of expense being $30,000 for street lighting, $50,000 for the fire department, $60,000 for charitable institutions, and $75,000 for the police department.

Population, in 1790, 16,359; in 1850, 42,985; in 1860, 40,522; in 1870, 48,956; in 1890, 54,955; in 1900, 55,807, including 31,500 persons of negro descent and 2600 of foreign birth.

History.—In 1670 an English colony under Governor William Sayle came to Albemarle Point, on the west bank of the Ashley River, three miles from the present city, and founded Charles Town (named in honor of Charles II.), the first permanent settlement in Carolina. In 1680 the public offices were removed to the present site of Charleston, where a number of families had previously settled. The population was increased, in 1685-86, by a company of Huguenot refugees, in 1755 by 1200 Acadian exiles, and in 1793 by 500 French refugees from Santo Domingo. In 1775 Charleston was one of the chief cities and the third seaport in importance in America, and it was the first Southern city to join the revolutionary movement. In March, 1776, a South Carolina convention met in Charleston and adopted the first independent State Constitution. On June 28, 1776, the garrison on Sullivan's Island, under Colonel Moultrie (see FORT MOULTRIE), repulsed an attack by the British fleet, and in 1779 the city was again successfully defended, this time against General Prevost; but on May 12, 1780, with its garrison of 7000 under General Lincoln, it was captured after a siege of six weeks by a British force of 16,000 under Sir Henry Clinton, its loss being regarded as one of the greatest disasters of the Revolutionary War. On December 14, 1782, the British evacuated the city, and the Americans again took possession of it. Charleston was incorporated in 1783, and until 1790 was the capital of the State. In 1784 the first bale of cotton exported from America to Europe was shipped from this port. Charleston was the centre of the nullification movement of 1832, and in 1860 the Democratic convention, being afterwards adjourned to Baltimore, met here, as did also the State convention which, on December 20, passed the first ordinance of secession. On April 12-13, 1861, the Civil War was opened by the Confederate bombardment and capture of Fort Sumter (q.v.) in Charleston Harbor. In 1863 a Federal fleet under Admiral Dupont unsuccessfully attacked the fortifications of the harbor, and, though closely besieged, and frequently bombarded, the city remained in possession of the Confederates until February 17, 1865, when it was evacuated, and all the public buildings, stores, cotton-warehouses, and shipping were burned by order of General Hardee, the Confederate commander. On the following day the Union forces under General Sherman took possession. On August 31, 1886, Charleston suffered terribly from an earthquake shock, the severest in the history of the United States. Seven-eighths of the houses were rendered unfit for habitation, many persons were killed, and property valued at over $8,000,000 was destroyed. The damage, however, was quickly repaired. The South Carolina Interstate and West Indian Exposition (q.v.) opened here December 2, 1901.

Consult: McCrady, *South Carolina Under the Proprietary Government* (New York, 1897); *South Carolina Under the Royal Government* (New York, 1899); and *South Carolina in the Revolution* (New York, 1901); also Powell, *Historic Towns of the Southern States* (New York, 1900).

CHARLESTON. The capital of West Virginia and county-seat of Kanawha County, about 130 miles south by west of Wheeling, at the junction of the Kanawha and Elk rivers, and on the Chesapeake and Ohio, the Kanawha and Michigan, and other railroads (Map: West Virginia, C 3). It has regular steamboat communication with the principal river ports, and is an important shipping point for coal, salt, and timber. There are deposits of natural gas and oil in the neighborhood. The manufactures include iron, engines and boilers, furniture, carriages, fire-brick, lumber, and woolens. Charleston has also boat-building yards, color and veneer works, and railroad shops of the Kanawha and Michigan. The chief buildings are the Capitol, the custom-house, and the county court-house. A fort was built at Charleston about 1786; the town was incorporated in 1794, and the city in 1870. Charleston has been the capital since 1870, with the exception of the period, 1875-85, when Wheeling was the seat of government. Population, in 1890, 6742; in 1900, 11,099.

CHARLESTON EXPOSITION. See SOUTH CAROLINA INTERSTATE AND WEST INDIAN EXPOSITION.

CHARLESTOWN. Formerly a city of Middlesex County, Mass., now incorporated with Boston (q.v.).

Charlestown was settled in 1629, by a small company from Salem, and was organized as a town in 1634. The territory originally within its limits has from time to time been divided up to form the towns of Woburn, Malden, Stoneham, Burlington, and Somerville, and parts of Medford, Cambridge, Arlington, and Reading. The battle of Bunker Hill was fought here on June 17, 1775, when the British set fire to the town, destroying 320 buildings, valued at $525,000. The battle is commemorated by the Bunker Hill Monument, a granite shaft 220 feet high, which was completed in 1843, the corner-stone of which was laid by General Lafayette, with appropriate ceremonies, in 1825, Daniel Webster delivering a notable address on each occasion. In 1873, its population then being 23,373, Charlestown was annexed to Boston. Consult: Frothingham, *History of Charlestown* (Boston, 1845), and Hunnewell, *A Century of Town Life, a History of Charlestown from 1775 to 1887* (Boston, 1888).

CHARLESTOWN. A city and county-seat of Jefferson County, W. Va., 55 miles northwest of Washington, D. C., on the Baltimore and Ohio and the Norfolk and Western railroads (Map: West Virginia, G 2). It is in a fertile agricultural district, has deposits of limestone and iron ore in the vicinity, and manufactures brass fittings, bridges, harness, collars, fly-nets, and various wooden products, cigars, etc. The city is known as a summer resort. It has a fine court-house and jail. Among its educational institutions are Stephenson Seminary and Powhatan College, both for young ladies. Charlestown was settled about 1750, and was first incorporated in 1786. It was here that John Brown was tried, condemned, and hanged December 2, 1859. On October 18, 1863, a Confederate cavalry division, under General Imboden, captured the place and secured 424 prisoners and large quantities of military stores; but, on the approach of a superior Union force, almost immediately withdrew. Population in 1890, 2287; in 1900, 2392.

CHARLES WILLIAM FERDINAND, Duke of Brunswick (1780-1806). See BRUNSWICK, HOUSE OF.

CHARLET, shär'lā'. NICOLAS TOUSSAINT (1792-1845). A French draughtsman and painter. He was born in Paris, December 20, 1792. He made the soldier of the Empire the subject of his peculiar wit and fancy, depicting him often with a touch of pathos. In 1817 he was placed for instruction under the painter Gros, and soon became renowned for his lithographed designs of military subjects. His "Grenadier of Waterloo" was one of his most popular productions. He did not confine himself to lithograph subjects altogether, but worked rapidly in water-colors, and in sepia and oil. Among his pictures in oil are the "Episode in the Campaign of Russia" and "Wounded Soldiers Halt-ing in a Rain." He took delight in representing humorously rustic scenes of peasants and children, and in attaching to these designs quaint descriptive mottoes. He enjoyed the friendship of the distinguished painter Géricault, whom he once restrained by good-natured ridicule from committing suicide. Charlet introduced Napoleon I. in so many of his pictures that his work has been called "an epic in pencil of the gray coat and the little hat." He died December 30, 1845. Consult de Lacombe, *Charlet, sa vie et ses lettres* (Paris, 1858).

CHARLEVILLE, shär'l'-vēl' (Fr., Charles's town). A town of France, on the Meuse, in the Department of Ardennes, about a mile from Mézières, with which it communicates by a suspension bridge over the Meuse (Map: France, L 2). It is a thriving place, well built, with clean spacious streets. It has a teachers' college, a lyceum, and a library of 23,500 printed volumes and 557 MSS. It manufactures hardware, leather, and beer, and the Meuse affords facilities for considerable trade in coal, iron, slate, wine, and nails. Population, in 1901, of town, 17,901; of commune, 18,772. It was the mediæval *Arcæ Remorum* and *Carolopolis*, and an important military station until the destruction of its fortifications in 1687.

CHARLEVOIX, shär'l'-vwä', Pierre François Xavier de (1682-1761). A French missionary and traveler, best known as the historian of 'New France.' He was born in Saint-Quentin, became a member of the Society of Jesus in 1698, and from 1705 to 1709 taught in the Jesuit College in Quebec, Canada. He then returned to France, where he taught "the humanities and philosophy" in a Jesuit college; but in 1720 was sent to America by the Duke of Orléans to gather information concerning the 'Western Sea,' then supposed to be only a short distance from the Mississippi River. Arriving at Quebec in September, he ascended the Saint Lawrence and the Great Lakes as far as Michilimackinac, and, after questioning the Indians, reported that the Pacific could probably best be reached by way of the Missouri, "the source of which," he said, "is certainly not far from the sea." He proceeded by way of Lake Michigan and the Illinois River to the Mississippi, descended in a small vessel to New Orleans, and, after suffering a shipwreck, went to the island of Santo Domingo, whence, in December, 1722, he returned to France. Subsequently he was sent on various missions by his order, and from 1733 to 1755 collaborated on the *Journal des Trévoux*. He was a voluminous writer, but is best known for his *Histoire et description générale de la Nouvelle France avec le journal historique d'un voyage fait dans l'Amérique septentrionale* (1744; English translation by J. G. Shea, 1865-72), a work which, though written from the Jesuit standpoint and frequently marred by carelessness and a fatiguing prolixity, contains much valuable material, and has been of great service to later writers on the history of the French in America. Among his other writings, some of which have considerable value, are: *Histoire et description générale du Japon* (1715; subsequent editions, much enlarged, 1736 and 1754); *Histoire du christianisme au Japon; Vie de la mère Marie de l'Incarnation, fondatrice des Ursulines de la Nouvelle France* (1724); *Histoire de l'île espagnole, ou de Saint-Dominique* (1730); and *Histoire du Paraguay* (1756; English translation, 1769).

CHARLIES. A nickname given to London watchmen in the reign of Charles I., suggested by that monarch's interest in improving the condition of the city street patrol. The term held good until the reorganization of the police force by Sir Robert Peel in 1829, after which time it was exchanged for that of 'bobbies' or 'peelers.'

CHAR'LOCK. See Mustard.

CHARLOTTE, shär'lŏt. A city and county-seat of Eaton County, Mich., 18 miles southwest of Lansing, on the Michigan Central and the Chicago and Grand Trunk railroads (Map: Michigan, J 6). It is of importance as a manufacturing centre, and has furniture and carriage factories, brewery, creamery, grain-elevators, grist-mills, etc. Settled in 1835, Charlotte was incorporated as a village in 1863, and in 1871 as a city. The government is administered by an annually elected mayor and a city council. The water-works are owned and operated by the municipality. Population, in 1890, 3867; in 1900, 4092.

CHARLOTTE. A city and county-seat of Mecklenburg County, N. C., 125 miles west by south of Raleigh, on Sugar Creek, and on the Southern and the Seaboard Air-line railroads (Map: North Carolina, B 2). It is in the gold region of the State, and a branch mint was established here in 1838. It was closed by the breaking out of the Civil War, reopened in 1869, and was made an assay office. The city has two female colleges, a military institute, and other educational institutions, a Carnegie public library, a library for the colored population, hospitals for white and colored persons, a United States court-house, Young Men's Christian Association building, and Vance Park. Biddle University (Presbyterian), for colored students, opened in 1867, is just outside the city limits. Charlotte is the centre of important commercial interests, and has extensive manufactures of cotton, iron, mill supplies, caskets, show-cases, leather belting, clothing, etc. The government, under a charter of 1866 and subsequent amendments, is vested in a mayor, biennially elected, and a city council, with school commissioners elected by popular vote. There are municipal water-works. Population, in 1880, 7094; in 1890, 11,557; in 1900, 18,091.

Settled about 1750, Charlotte was incorporated in 1768, and in 1774 was made the county-seat. The so-called Mecklenburg Declaration of Independence (q.v.) was adopted here on May 31, 1775, the signers of which are commemorated by a monument. In September, 1780, Lord Cornwallis, after a short skirmish, entered Charlotte and occupied it for several days, and later in the year General Gates made his headquarters here, until superseded by General Greene on December 2. Consult W. H. Foote, *Sketches of North Carolina* (New York, 1846).

CHARLOTTE. (1) The daughter of Sir Jasper in Fielding's farce *The Mock Doctor*. The character was suggested by Lucinde in Molière's *Médecin malgré lui*. (2) The gay fiancée of Cantwell, who later marries Darnley, in Bickerstaffe's *Hypocrite*, suggested by Marianne in Molière's *Tartuffe*. (3) The simple wife of Albert, whom Werther loves, in Goethe's *Sorrows of*

Werther. (4) The sweetheart of Wrangle in Cibber's comedy *The Refusal.*

CHARLOTTE, Aunt. See Yonge, Charlotte M.

CHARLOTTE AMALIE, shär-lŏt′ å-mä′lē-*e*. The only town of the island of Saint Thomas, in the West Indies (Map: West Indies, P 5). It has a spacious harbor and is an important coaling station. Population, in 1901, 8540.

CHARLOTTE ELIZABETH, shär′lŏt ē-lĭz′-å-bĕth. The pseudonym of Mrs. Charlotte Elizabeth Tonna, an English religious writer (1790-1846).

CHARLOTTE HARBOR. A shallow inlet on the gulf coast of Florida, extending inland about 25 miles (Map: Florida, F 5). The inner harbor is about 10 miles wide at its widest part. The outer harbor is separated from the Gulf of Mexico by a line of keys which reduces the main entrance to the bay to a width of three-fourths of a mile. Pine Island partly divides the inner from the outer harbor. Wild water-fowl and fish are plentiful.

CHARLOTTENBURG, shär-lŏt′ten-bōōrK (Ger., Charlotte's town). A prosperous town and residential suburb of Berlin in the western outskirts of the city (Map: Prussia, E 2). It is connected with Berlin by street railway and by the Stadtbahn, an elevated road. It has numerous educational institutions, including a gymnasium, high school, royal institute of glass-painting, artillery and engineering school, technical academy, physical-technical institute, and a military preparatory school. The Technical Academy is a spacious and noteworthy building, containing statues and busts and a valuable architectural museum. The manufacturing interests of the city are important: chief among them is the Royal Porcelain Factory, founded in 1761, a famous and interesting institution. There are also iron-foundries, and manufactures of machinery, glass, pottery, electrical apparatus, paper, leather, and chemicals. Charlottenburg was founded in 1705, by Frederick I., and since the Franco-Prussian War has grown with astonishing rapidity. The palace, the main portion of which was finished by 1699, under Schlüter's direction, for Sophia Charlotte, second wife of Frederick I., consists of a group of buildings, with a pleasant garden laid out by the French landscape gardener Le Nôtre. The rococo ornamentations and the porcelain chamber attract attention. Emperor Frederick III. was confined here during a part of his fatal illness. In the garden is the handsome Doric mausoleum, erected in 1810 by Gentze, according to the designs of Schinkel, containing the tombs of Frederick William III. and Queen Louisa, and Emperor William I. and Empress Augusta. The recumbent figures of the first two, by Rauch, are particularly fine. Population, in 1890, 77,000; in 1900, 189,000.

CHARLOTTESVILLE, shär′lots-vĭl. A city and county-seat of Albemarle County, Va., 100 miles northwest of Richmond, on the Rivanna River, and on the Southern and the Chesapeake and Ohio railroads (Map: Virginia, F 3). It is the seat of the University of Virginia (q.v.), founded by Thomas Jefferson, and of Albemarle College, Rawlings Female Institute, and other educational institutions. Monticello, Jefferson's home, is but three miles distant, to the southeast. The city has woolen, flour, and planing mills, cigar-factories, wine-presses, etc. Settled as early as 1744, Charlottesville was chartered as a city in 1888. The government, under a charter of 1900, is administered by a mayor, elected every two years, and a city council. The waterworks and gas plant are owned and operated by the municipality. Population, in 1890, 5591; in 1900, 6449.

CHARLOTTETOWN, shär′lot-toun. Capital of Prince Edward Island, Canada, in Queen's County, situated on the southern coast, on Hillsborough Bay, and at the confluence of three rivers (Map: Prince Edward Island, F 3). It has a fine harbor, which admits the largest vessels. The town stands on rising ground, and contains the Provincial Government and Dominion buildings, a court-house, Young Men's Christian Association building, an athenæum, exchange, city hall, hospitals, an asylum for lunatics, a normal school, Prince of Wales College, Saint Dunstan's (Roman Catholic Church) College, a Methodist college, and a business college. A woolen factory, iron-foundry, carriage and furniture factories, railroad workshops, breweries, and the exportation of agricultural produce and fish, make it a busy place. There are steamers to various ports of the Dominion, churches, newspapers, banks, gas and electric lights, excellent water-works, etc. It is the seat of a United States consulate and the see of a Roman Catholic bishopric. Population, in 1891, 11,373; in 1901, 12,080. Charlottetown was founded about 1750, as the French Port la Joie. In 1775, during the Revolutionary War, the town was looted by two American privateers, an act which was condemned by Washington, who liberated the prisoners and restored their property. Canadian confederation originated at a conference held in 1864 in Charlottetown.

CHARM. See Incantation and Magic.

CHARMANTE GABRIELLE, shär′mänt′ gå′brē′ĕl′. A French song, written by Henry IV. to his mistress, Gabrielle d'Estrées, and sent to her in a letter dated May 21, 1597. The music was also formerly attributed to Henry, but it is almost certainly by his Court musician, Eustache Ducaurroy. The music was not original, being adapted by Ducaurroy from an air *Noël* which he had composed previously. The song was included in the *Thesaurus Harmonicus* of Besard (1602), in the *Cabinet, ou Trésor des nouvelles chansons* (1602), and continued popular till the time of the Revolution. Revived after the Restoration, it still holds a certain share of public favor.

CHARMIAN, kär′mĭ-*a*n. The faithful attendant of Cleopatra, in Shakespeare's *Antony and Cleopatra.* On the death of her royal mistress, she applies one of the fatal asps to her own body and dies.

CHARMIDES, kär′mĭ-dēz (Lat., from Gk. Χαρμίδης) (c.450-404 B.C.). A pupil of Socrates, cousin of Critias, and maternal uncle of Plato, who introduces him in one of the *Dialogues.* He was one of the 'Thirty Tyrants' who came into power in Athens in B.C. 404, but was slain the same year, while fighting against Thrasybulus. See Plato, *Charmides,* and Xenophon, *Memorabilia.*

CHARMIDES. One of the dialogues of Plato representing a conversation between Socrates, young Charmides, and two other Athenians, on the subect of moderation.

CHARNAY, shär'nȧ', Claude Joseph Désiré (1828—). A French traveler, born in Fleurieux, Rhône. In 1857, under the auspices of the French Government, he began a long series of expeditions to Mexico and other parts of the world. With the further assistance of Pierre Lorillard, he, in 1880, undertook the exploration and excavation of the ancient cities of Mexico. He made many important discoveries, the chief results of which are set forth in the collection at the Museum of the Trocadéro, and in his work *Les anciennes villes du nouveau monde* (1884), of which an English translation appeared in 1887 (*The Ancient Cities of the New World*, by Mesdames Gonino and Conant; introduction by Allen T. Rice). He has also published *Cités et ruines américaines* (1863), with an atlas.

CHARNEL-HOUSE (OF. *charnel*, *carnel*, Med. Lat. *carnale*, charnel, from *caro*, flesh + *house*). A chamber situated in a churchyard or other burying-place, in which the bones of the dead which were thrown up by the grave-diggers were reverently deposited. The charnel-house was generally vaulted in the roof, and was often a building complete in itself, having a chapel or chantry attached to it. In such cases the charnel-vault was commonly a crypt under the chapel, and even in churches it was not uncommon for the vault or crypt to be employed as a charnel-house.

CHARNISÉ, shär'nē'zȧ', Charles de Menou, Seigneur D'Aulnay de (? -1650). A French proprietor in Acadia. In 1632 he accompanied the party under Isaac de Razilly which settled at La Have for the purpose of recovering the Acadian possessions of France. In 1635 Charnisé commanded an expedition to the Penobscot River, where he conquered the fort which had been built there by the Plymouth colonists, telling its defenders that in the following year he would annex the entire region to the fortieth degree, north latitude. After the death of Razilly, Charnisé succeeded to the command, and made Port Royal (Annapolis) the chief settlement of Acadia, then a vast territory embracing what is now New Brunswick and Nova Scotia, and afterwards extending to the Penobscot. He later treacherously captured Fort La Tour, and in 1645 went to France, where he was appointed Governor and lieutenant-general of Acadia by the Government of Louis XIV. (1647). As soon, however, as the charge of treachery reached the Court, Charnisé was dismissed from office and superseded by Le Tour.

CHAR'NOCK, Stephen (1628-80). An English Puritan theologian. He was educated at Cambridge and at Oxford, and became proctor at the latter when Oliver Cromwell was chancellor. He went to Ireland as chaplain to Henry Cromwell, Lord Deputy. In 1600 he was silenced by the Act of Uniformity, and returned to London, where he preached for fifteen years, but without a settled congregation. He was a man of great piety and vast learning. After his death his writings were published, the chief being *On the Excellence and Attributes of God* (1681-82). In 1860 President James McCosh published an edition of Charnock's works, with a life of the author.

CHARN'WOOD FOREST. A forest in the northwestern part of Leicestershire, England. It lies on a gradual rise of ground culminating in Bardon Hill, which is 900 feet high.

CHARON, kā'ron (Lat., from Gk. *Χάρων*, Etrusc. *Charun*). In classical mythology, the ferryman of the Lower World, who conveys the souls of the dead to the realm of Hades. Charon does not appear in the Homeric poems, though he was early prominent in popular belief and appeared in one of the lost epics, whence Polygnotus introduced him into his great painting of "Odysseus in the Lower World." From the Fifth Century B.C. Charon appears frequently in literature. He is also often represented on the Athenian white lecythi, vases buried with the dead, where he is depicted as a bearded man wearing the short tunic and pointed cap of a seaman, in a skiff with a single oar. To pay the fare a small coin (*obolus*) was placed in the mouth of the dead. On Etruscan monuments Charon is represented as a demon of death, with bestial face, huge tusks, and pointed ears, carrying snakes, or, more commonly, a large hammer. The bodies of fallen gladiators were dragged from the arena by a man disguised as this Etruscan demon.

CHARONDAS, kȧ-rŏn'dăs (Lat., from Gk. *Χαρώνδας*). A celebrated legislator of ancient Greece. He was born at Catana, in Sicily, and is mentioned, with Lycurgus, Solon, Zaleucus, and others, as a famous lawgiver. To him were ascribed the laws of the Chalcidian colonies in Sicily and Italy. The date when he lived is quite uncertain, but he probably belonged to the Sixth Century B.C. Little is known of his laws, for what purports to have originated with him is probably to be assigned to later modifications of his work. He is said to have required that whoever proposed a change in his laws should appear before the people with a halter round his neck, ready to forfeit his life if the change were not adopted.

CHARON OF LAMPSACUS (first half of Fifth Century B.C.). One of the earlier Greek historical writers, known as logographers. He preceded Herodotus in narrating the events of the Persian War. The extant fragments of his works were collected by Kreuzer, in his *Historicorum Græcorum Antiquissimorum Fragmenta*; and by Müller, *Fragmenta Historicorum Græcorum* (Paris, 1841).

CHARON'S (kā'ronz) **STAIRCASE** (translation of Gk. *Χαρώνειος κλῖμαξ*, *Charōneios klimax*). A series of steps which led from the middle of the stage down into the orchestra, in the Greek theatre. It was thus designated because 'the ghost' generally made his entrance by them.

CHARPENTIER, shär'päɴ'tyȧ', François Philippe (1734-1817). A French mechanic, engraver, and designer. He was born in Blois, and studied engraving in Paris. He is the inventor of the aquatint or nitric-acid process in engraving, but sold his secret to Count Caylus. The earliest engravings in aquatint made by him are the following: "Perseus and Andromeda," after Vanloo; "The Decapitation of John the Baptist," after Guercino; and "The Children's Bacchanal," after de Witt. As 'royal mechanician' he afterwards effected numerous improvements in the construction of lighthouses, war-vessels, and firearms.

CHARPENTIER, Gustave (1860—). A French composer, born in Dieuze, Lorraine. He studied at the Paris Conservatory under Massart, Pessard, and Massinet, taking the Grand Prix de Rome in 1887. He has written numerous songs and orchestral pieces and a symphonic drama, *La vie du poète*, produced at the Grande Opéra in 1892. But the most notable of his works is the opera *Louise*, of which he wrote both words and music, and which was produced in 1900 at the Opéra Comique. The scene is laid in modern Paris (in Montmartre) and the realism and dramatic power of the libretto as well as the beauty and originality of the music took Paris by storm, and placed Charpentier in the front rank of modern composers. He is also the author of three operas which are as yet in manuscript.

CHARPENTIER, Johann Friedrich Wilhelm Toussaint (1738-1805). A German mining engineer. He was born in Dresden, studied law and mathematics at the University of Leipzig, and became instructor in mathematics at the Mining School of Freiberg, where he became interested in mining methods and metallurgy. As the introducer into Germany of the processes of amalgamation employed in Hungary and of various other improvements, Charpentier takes high rank among the German metallurgists of the Eighteenth Century. His scientific methods of mining as well as his geognostic investigations greatly stimulated the development of these branches in Germany.

CHARPENTIER, Louis Eugène (1811-90). A French painter. He was born in Paris and studied there under Gérard and Cogniet. He exhibited first in the Salon of 1831, "Le bivouac de cuirassiers," and afterwards became known entirely as a painter of battle pictures in a large panoramic style with great attention to detail. In Versailles, where he became professor of designing in 1876, there are three pictures by him—"La bataille de la Moscova" (1843), "L'épisode du siège d'Anvers" (1845), and "La bataille de Tchernaïa" (1857).

CHARPENTIER, Marc Antoine (1634-1702). A French composer, born in Paris. He studied under Carissimi in Rome, and became chapelmaster to the Dauphin under Louis XIV. Here he came into rivalry with Lully, who displaced him. Charpentier then turned his attention to religious music and was at his death chapelmaster of the Sainte Chapelle. He wrote the opera *Circé* (1675); the music to the *Malade imaginaire*, *Le sort d'Andromède* (c.1670); *Médée* (1693): and a number of masses and pastorales. Some of his music, still in manuscript, is in the Bibliothèque Nationale in Paris.

CHARPIE, shär′pê (Fr., from p.p. of OF. *charpir*, to pluck, from Lat. *carpere*, to seize). Ravelings of linen; lint. They were used by surgeons as dressing for discharging wounds, ulcers, etc., before sterilized and sublimated gauze came into vogue.

CHARRAS, shȧ′rȧ′, Jean Baptiste Adolphe (1810-65). A French military writer, born in Pfalzburg, Lorraine. He entered the artillery and engineering school in Metz, became an officer of artillery, served in Algeria, and in 1848 was appointed a lieutenant-colonel and Under-Secretary of State in the Ministry of War. Having vigorously opposed the politics of Louis Napoleon, he was banished after the coup d'état, and resided in Belgium, Holland, and Switzerland. He wrote two valuable works—*Histoire de la compagne de 1815: Waterloo* (1858), and an incomplete *Histoire de la guerre de 1813 en Allemagne* (1866).

CHARRETTE, shȧ′rĕt′, The Knight of the (translation of Fr. *Chevalier de la Charrette*). A contemptuous nickname earned by Lancelot (q.v.), in a French variation of the Arthurian legends. According to this version the knight, while galloping to the rescue of Guinevere, fell from his horse and was brought home in a cart (*charrette*). A modernized edition of Chrestien de Troyes's *Roman de la Charrette* appeared in Rheims, 1849, under the direction of Tarbe.

CHARRIÈRE, shȧ′ryâr′, Isabelle de Saint-Hyacinthe de (1740-1805). A Swiss writer. She was born in Utrecht, the daughter of a Dutch nobleman. In 1771 she married a Swiss who had been her brother's teacher, and went to live near Neuchâtel. As a writer she was entirely French in spirit. Under the pseudonym Abbé de Latour, she published *Lettres neuchâteloises* (1784); *Caliste, ou lettres écrites de Lausanne* (1788)—her masterpiece—and *Les trois femmes* (1798). She also wrote some plays. She was on terms of close friendship with Madame de Staël and Benjamin Constant, and was well known as a brilliant and beautiful woman.

CHARRON, shȧ′rôɴ′, Pierre (1541-1603). A French theologian and philosopher. He was one of the twenty-five children of a bookseller of Paris. He practiced law for a time in Paris, but not having immediate success, he studied theology, and rose to eminence as a preacher. In Bordeaux he formed a short but important friendship with Montaigne, who, on his death in 1592, requested Charron to bear the arms of the Montaigne family. In 1594 Charron published *Traité des trois vérités*, in which he dogmatically defended the Roman Catholic Church. This was followed by a book of sermons, and in 1604 came his most remarkable work, *Traité de la sagesse*, in which he expressed himself skeptically with regard to science, but asserted the competence of reason to construct an adequate system of morality. Consult Liebscher, *Charron und sein Werk: De la sagesse* (Leipzig, 1890).

CHARRUA, chär-ro͞o′ä. A savage and warlike tribe formerly roving, without fixed homes, over the greater part of Uruguay. They were of dark complexion and heavily built, fought on horseback, and used the bolas. They had the custom of cutting off a finger-joint on the death of a relative. Owing to their fierce and continuous wars with the Spaniards, they are now practically extinct. Their language, spoken also by a few subordinate tribes, constituted a distinct stock.

CHART (Fr. *charte*, charter, Lat. *charta*, paper, from Gk. *χάρτη*, *chartē*, paper). A marine or hydrographic map, exhibiting a portion of a sea or other body of water, with the islands, adjacent coasts, soundings, currents, etc. (See Map.) Charts are made of convenient size and scale for the purpose desired and are usually constructed on the principle of Mercator's projection; charts of the oceans on the gnomonic projection are, however, published by the Hydrographic Office of the United States Navy for the convenience of navigators who wish to follow great-circle courses: and the coast and harbor charts of the United States, published by the United States Coast and Geodetic Survey, are on the polyconic projection. Charts are constructed with more accuracy than ordinary maps, and efforts are made to embody in them all the information possible. The meridians and parallels of latitude are drawn at convenient intervals, and on harbor charts the exact geographical position of some datum point is given. One or more compass-roses (i.e. plans similar to the face of a compass-card) are engraved in the chart where most needed, or where they will not interfere with soundings or other matters, and these show the magnetic variation, while the annual change is recorded in a note. In the case of harbor charts the rise and fall of the tide and luni-tidal interval are given; this is important when the tidal range is considerable, for the depths, or soundings, recorded are based upon some particular state of the tide, usually that of mean low water. Shoals and shallow waters are indicated by dotted shading, or stippled tint, in order that their presence may more readily be noticed, and rocks are marked by crosses or other conventional signs. The soundings are expressed in fathoms, or in feet, whichever will best serve in the particular locality, and a note under the title states which is used. The character of the bottom is indicated by symbols, giving the kind of material (sand, mud, rock) and its hardness, fineness, color, etc.

Lighthouses, buoys, beacons, and other aids to navigation are carefully shown in their proper position; and, when desirable to do so, the proper courses for entering or leaving a port or channel are indicated by broken lines, alongside which the compass courses are printed. The depths and coast-line in nearly all parts of the world are constantly changing, as are the lighthouses, buoys, and aids to navigation. This requires unceasing watchfulness on the part of chart-issuing offices, and the correction of charts constitutes more than half the expense connected with their production and issue. Charts already printed and on the shelves of the issuing office are corrected by hand, several draughtsmen being constantly engaged in the work. If, however, the correction in this manner takes more than a few minutes, the copies on the shelves are destroyed and a new edition printed with the correction embodied in the engraving. The sources of information for corrections are the reports from men-of-war or merchant ships, from lighthouse boards, inspectors of harbors, channels, and waterways, new surveys, and the like. These are embodied in *Notices to Mariners* and published at short intervals, usually once a week. The information is arranged in the most convenient manner possible for the use of navigators, the number of each chart affected by a note being stated. In addition to this, the notices give a list of charts of which new editions have been published, or which have been extensively corrected.

For purposes of navigation the character of the projection (i.e. the plan by which the curved surface of the earth is represented on a plane) is most important. The Mercator projection is most used and decidedly the most popular. The meridians are rectilinear and parallel, and this enables the navigator to lay down the compass course as a straight line; and charts on this projection of the same scale and latitude may be joined at the edges. Neither of these important characteristics is possessed by the polyconic, which is best suited to the delineation of small areas such as harbors of moderate extent or certain types of ocean charts. The line of sight and the great-circle course are nearly straight lines on a polyconic chart, and areas and shapes near the central meridian are undistorted. The saving of distance through following great-circle areas is very slight except on long voyages, and the conditions of average wind and weather are likely to reduce the value of the saving even then, because the great-circle arc, when it differs from the rhumb line (q.v.), always lies on the polar (and therefore usually the colder and stormier) side of it. Whether it is desirable to follow a great circle or not can readily be determined by comparing the course as laid down on a great-circle chart (gnomonic projection) with a wind, weather, and current chart, such as the pilot chart issued by the Hydrographic Office of the United States Navy. See PILOT CHART.

Charts are now chiefly printed from engraved plates (copper, except in France, where many soft steel plates are used), for various reasons, the principal of which is that it facilitates the introduction of new matter in certain parts without the necessity of reproducing the whole. To effect the correction the plate is turned face downward on a smooth anvil or hard surface, and the area to be re-engraved smoothed out and the metal brought up flush with the general surface of the plate by beating on the back over the predetermined area with a round-faced hammer. Preliminary charts, and others of temporary interest, or of which the details do not change, are largely produced by photo-lithography. With this process tough, flexible paper cannot be satisfactorily used, and if a photolithographic chart is to be much handled it requires backing with cloth.

As already stated, there are in the United States two chart-making offices, the Hydrographic Office of the Navy, and the Coast Survey, the latter publishing charts (about 800) of the United States coast only; and the former, charts (about 1500) of the Great Lakes and of foreign territory and seas. The main office of each of these establishments is in Washington, but for the purpose of gathering and disseminating information of service to navigators, the Hydrographic Office has branches in all the principal seaports of the United States and several on the Great Lakes. It is likely that additional ones will soon be opened at Manila and Honolulu, with observing stations at Guam and Tutuila, when these can be reached by telegraph. In Great Britain the Hydrographic Office is under the Admiralty. Charts are also published by nearly all the European powers, and by Brazil, Chile, and Japan; and there are several private makers who issue charts of special localities. The price of Government charts is very low, barely sufficient to cover the cost of printing and paper.

CHARTA, kär′tȧ, MAGNA. See MAGNA CHARTA.

CHARTE, shärt (Fr., charter, from Lat. *charta*, paper). A French term, used especially to designate the constitution or organic law granted by Louis XVIII. on his restoration in 1814. It was formerly written *chartre*. The word is an old one and applied to a large class of legal documents. Among the best known of the older chartes was the *Charte Normande* or *aux Normands*, containing the privileges granted to the Normans (1314-15) by Louis X. The Trésor des Chartes of France is one of the important bureaus of the national archives. The Ecole des Chartes in Paris is the leading school of the world for instruction in the study of historical documents. The charte of 1814 has always been considered the fundamental law of constitutional monarchy when that form of government has existed in France. It was an act of royal grace and not in any sense a popular constitution or even a contract between King and people. This fact eventually led to the Revolution of 1830. The charte sworn to on the 29th of August of that year by King Louis Philippe explicitly recognized the sovereignty of the people. This document, with some modifications, remained in force till the Revolution of 1848.

CHARTER (OF. *chartre*, from Lat. *chartula*, dim. of Gk. *χάρτη*, *chartē*, paper). A formal writing by which property is granted or rights and privileges are conferred. The term was formerly applied to a written conveyance of land, and property held under such an instrument was, in Anglo-Saxon law, called 'charter-land,' or 'bookland.' In this sense, the word has given way to 'deed.'

The term charter is used to describe a grant of land, franchises, or other privileges by the State, or a solemn guaranty by the sovereign of popular rights. *Magna Carta* (q.v.), or the great charter issued by King John in 1215, is one of the chief constitutional documents of Great Britain. It has been the custom of the British Government for centuries to grant political charters to some of its colonies.

In American colonial history, grants of franchise, governmental privileges, and estates to companies for the purpose of establishing colonies, to the inhabitants of colonies in general, or to individual proprietors were embodied in charters. Of the first sort were the charters of Massachusetts Bay, granted by Charles I. (1629), and the charter of Georgia, granted by George II. (1732). Of the second sort was the charter of Connecticut granted to the people of the colony by Charles II. (1662). Of the third sort were the original charter of New York, granted to the Duke of York by Charles II. (1664), and the charter of Maryland, granted to Lord Baltimore by Charles I. (1632). Some of the colonial municipal charters remain in force to the present day, but the general provisions of charters are of little use in the United States, as corporations are now created by the several Legislatures or by Congress. Blackstone describes such charter governments as "civil corporations, with the power of making by-laws for their own interior regulations, not contrary to the laws of England; and with such rights and authorities as are specially given them in their several charters of incorporation." Judge Story criticises Blackstone's view, declaring that the charter colonies of America "were great political establishments, possessing the general powers of government and rights of sovereignty, dependent indeed on the realm of England, but still possessing within their own territorial limits the general powers of legislation and taxation." None of the British colonies, at present, "possess the general powers of government and rights of sovereignty." Their legislative authority is at all times subordinate to that of Parliament, and their legislative acts partake more of the nature of by-laws than of Parliamentary statutes. The charter of their legislative powers and privileges is known as the "Colonial Laws Act, 1865."

In modern municipal law, the term charter is most frequently used to denote the grant of a *franchise* (q.v.) by the sovereign power to a corporation. According to Blackstone, "the King's consent is absolutely necessary to the erection of any corporation, either expressly or impliedly given," and "the immediate creative act is usually performed by the King alone, in virtue of his royal prerogative."

In the United States, corporations are chartered, as a rule, by legislative act; either by a special statute which confers upon a particular corporation the special powers and privileges named therein, or under a general law which provides the method to be pursued by persons who would organize a corporation. In the latter case, the articles of association, taken in connection with the provisions of the general statute, constitute the charter. If the corporation is a public one, such as a city, county, or town, its charter may be changed at will by the Legislature. Such a corporation is a mere agency of the State for the exercise of governmental powers within a particular area. It has no vested right to any of its powers or franchises. Its charter "is not a contract, but a law for the public good." On the other hand, the charter of a private corporation is a contract between the State and the corporators. As such, it is protected from repeal or modification by the provision of the Federal Constitution which declares that "no State shall . . . pass any . . . law impairing the obligation of contracts." (Article I., § 10.) The State granting the charter may, however, reserve the right to alter, amend, or repeal it. If the State does make this reservation, it is at liberty to act in accordance therewith, notwithstanding the constitutional provision. Consult: Dicey, *Lectures Introductory to the Study of the Law of the English Constitution* (4th ed., London, 1893); Cooley, *General Principles of Constitutional Law in the United States*. See CORPORATION; DARTMOUTH COLLEGE CASE.

CHARTERHOUSE (a corruption of Fr. *Chartreuse*). The name applied in England to Carthusian monasteries. The first was founded at Witham, on the borders of Selwood Forest, in 1178, by King Henry II., in fulfillment of a vow made on the occasion of his memorable penance at the tomb of Saint Thomas of Canterbury. The second was at Hinton in Somersetshire (1222); the third at Beauvale, Nottinghamshire (1343); the fourth, and most famous, to which the name is restricted in general usage, was situated in London. It was endowed by the will of Michael de Northburgh, Bishop of London, 1355-61, and the monks took possession of it in 1371. Its history is not of much general interest until the reign of Henry VIII., when in 1535 and the following years a number of the monks suffered death for refusing to acknowledge the royal supremacy in spiritual matters, the prior, John Houghton, being the first martyr for the old faith under the Reformation. The monastery was dissolved in 1538. The house passed through various hands, returning to the Crown under Mary by the attainder of the Duke of Northumberland, and under Elizabeth by that of the Duke of Norfolk. The latter's son, the Earl of Suffolk, sold it in 1611 for £13,000 to Sir Thomas Sutton, whose coal lands in Durham had made him one of the richest Englishmen of his day. He richly endowed it as a hospital or almshouse for poor old men and a free grammar school, "to feed, clothe, and educate a certain number of poor boys, who without such assistance would be likely to go untaught." The 'poor brethren' were 80 in number, none being admitted under 50 years of age; they must be bachelors and members of the Church of England. Each had a separate apartment, a share of attendance from domestics, and ample, though plain, diet, and an allowance of about £26 a year for clothes and pocket money. This part of the institution is best known by the famous description of it given in *The Newcomes* by Thackeray, who was himself educated at Charterhouse. The school was not long limited to the forty foundation scholars, and grew until at the present time it ranks among the great public schools of England. Among the eminent men who have been educated here are Blackstone, Addison, Steele, John Wesley, and George Grote. In 1872, the old location amid crowded streets being thought unhealthy, the school removed to Godalming in Surrey, 30 miles from London. The old premises were sold to the Merchant Taylors' School, which is now installed here in handsome new school buildings erected in 1875. The quaint old hospital and chapel, the latter containing Sutton's tomb, still remain. Consult: Hendricks, *The London Charterhouse* (London, 1889); Haig Brown, *Charterhouse, Past and Present* (Godalming, 1879); Eardley-Wilmot and Streatfield, *Charterhouse, Old and New* (London, 1894); Tod, *Charterhouse* (London, 1900); Doreau, *Henri VIII. et les martyrs de la Chartreuse de Londres* (Paris, 1891).

CHAR'TERIS, Archibald Hamilton (1835—). A Scottish clergyman and educator. He was born in Wamphray, educated in Edinburgh, Tübingen, and Bonn, and in 1863 was appointed minister of the Park Parish, Glasgow. From 1868 to 1898 he was professor of biblical criticism in Edinburgh, where he is now professor emeritus. He was a royal chaplain in 1869, and in 1892 moderator of the General Assembly of the Church of Scotland. He has been prominent in the development of many important Church activities. His publications include a *Life of Professor James Robertson* (1863); *Canonicity* (1881); and *A Faithful Churchman* (1897).

CHARTER OAK. A large tree that stood in Hartford, Conn., until blown down August, 1856, when its age was computed to be nearly 1000 years. The tradition relating to it is as follows: When Sir Edmund Andros was appointed Governor-General of New England he came to Hartford in 1687 to receive the colonial charter. This the colonists were loath to surrender, but, appearing to submit, carried it to the council-chamber, where, during the debate, the lights were extinguished and in the ensuing confusion the document was carried from the room to its subsequent hiding-place in the hollow of the tree. Here it remained until 1689, when the deposition of Andros made further concealment unnecessary.

CHARTER-PARTY (Fr. *charte partie*, divided deed, one part being given to each party concerned; cf. *indenture*). In maritime law, a contract under seal by the owner or master of a ship, to carry a complete cargo of goods or to furnish a vessel or part of a vessel for that purpose. It is one form of the contract of *affreightment* (q.v.), the other being the familiar *bill of lading* (q.v.), which is employed when goods are shipped to form only a part of an intended cargo. Such a charter may operate as a lease of the ship itself, which thereupon passes under the control of the charterer; or, more commonly, it confers upon the shipper the right to have his entire cargo conveyed in the chartered vessel, in which case the charterer acquires no property right in the ship, nor any voice in its management. In the latter form of charter-party the master or owner of the vessel occupies the position of a common carrier (q.v.). But where the charter transfers the possession and control of the ship, the master is the agent of the charterer, who becomes responsible for his acts and for those of the crew, and who, in the event of the chartered ship's earning salvage, becomes entitled to the salvage award.

The ordinary charter-party describes the parties, the ship, and the voyage, stipulates that the ship is seaworthy, and will receive the cargo and perform the voyage promptly, and notes those perils of the sea for which the master and ship-owner will not be responsible. On the part of the freighter, it stipulates to load and unload within a given time, with an allowance of so many lay or running days for loading and unloading the cargo, and the rate and time of payment of the freightage, and date of commencement of demurrage. Consult Scrutton, *Contracts of Affreightment as Expressed in Charter Parties and Bills of Lading* (4th ed., London, 1899).

CHARTIER, shär'tyâ', Alain (c.1390-c. 1440). A French poet and diplomatist of very great literary influence in the Fifteenth Century, but since then almost forgotten save for the famous kiss bestowed by Margaret of Scotland, wife of Louis the Dauphin, afterwards Louis XI., on the lips of the sleeping poet, who is said to have been the ugliest man of his day. He studied in Paris, served Charles VI. in important negotiations, and Charles VII. as notary and financial secretary, as well as on a mission to Scotland. He was prebendary and archdeacon of Notre Dame de Paris. Passages of his *Bréviaire des Seigneurs* were set to be learned by heart by Court pages; Marot and Saint-Gelais, poets of the second following generation, praise him warmly; the English Lydgate studied and imitated him. His poems are mainly of lovers' controversy, but his *Livre des quatre dames* and *Le quadrilogue invectif* (1422) were evoked by the disasters of Agincourt and show a fine patriotic spirit. His *Lay de la belle dame sans merci* suggested at least a title to Keats. His work shows a boldness and freedom of thought that foreshadow the Renaissance. Consult Delaunay, *Etude sur Alain Chartier* (Paris, 1876).

CHARTISM. A Radical reform movement which grew to culmination in England from 1838 to 1848. Its name originated in the *National* or *People's Charter*, which embodied the scheme of reform under six specific titles: (1) The right of voting to every male and every naturalized foreigner resident in the kingdom for more than two years, who should be 21 years of age, of sound mind, and unconvicted of crime; (2) equal electoral districts; (3) vote by ballot; (4) annual Parliaments; (5) no property qualification for members; and (6) payment of members of Parliament for their services. The Reform Bill of 1832 had failed to satisfy the working classes, and after a terrible period of commercial depression and want, an unsuccessful attempt was made to institute a greater reform in the House of Commons, whereupon six members of Parliament and six workingmen drew up the charter, which was hailed by large numbers of persons with enthusiasm. Immense meetings were held throughout the country, many of them attended by two or three hundred thousand people. Fiery orators fanned the excitement, and, under the guidance of extremists, physical force was spoken of as the only means of obtaining justice. The more moderate were overruled by the fanatics, and the people, aroused by suffering, were easily wrought into frenzy by those who assumed direction. The Chartist propaganda was vigorously carried on by Feargus O'Connor in the *Northern Star*, an organ which attained phenomenal circulation. In the autumn of 1838 torchlight meetings were held. Their danger was obvious, and they were at once proclaimed illegal. Some of the leaders were arrested, amid intense excitement, and imprisoned. A body calling itself the National Convention, elected by the Chartists throughout the kingdom, commenced sitting in Birmingham in May, 1839. It proposed various means of coercing the legislature into submission, recommending a run on the savings banks for gold, abstinence from excisable articles, exclusive dealing, and, as a last resort, universal cessation from labor. During its sitting a collision took place with the military in Birmingham. Public meetings were forbidden, and alarming excesses were committed by the irritated mob. In June, 1839, a petition in favor of the charter was presented to the House of Commons, ostensibly signed by 1,280,000 persons. The House refused to name a day for its consideration and the national convention retaliated by advising the people to cease from work throughout the country. This advice was not followed, but the disturbance increased, and in November an outbreak took place in Newport, which resulted in the death of ten persons and the wounding of great numbers. For their part in this insurrection three leaders were sentenced to death, but their punishment was afterwards commuted to transportation. In 1842 great riots took place in the northern and midland districts, not directly caused by the Chartists, but encouraged and aided by them after the disturbances began. In the same year an attempt was made by Joseph Sturge to unite all friends of popular enfranchisement in a complete suffrage union, but he only succeeded in dividing their ranks. In 1848 the turmoil in France created great excitement in England, and much anxiety was felt lest an armed attempt should be made to subvert the institutions of the country. Two hundred thousand special constables were enrolled in London alone, among which number was the subsequent Emperor, Napoleon III. A serious outbreak was expected in London on the day O'Connor named in Parliament as the time when he would counsel violence if his demands were not met. On the fateful day, however, he advised the assembled multitudes to disperse to their homes, and thenceforth lost his influence with the masses.

In the language of Charles I. (q.v.), the opponents of Chartism denied that men *as such* had a right to vote; their right was to be well governed, and universal suffrage was more likely to destroy society than to confer happiness or insure justice.

From 1848 Chartism as an organization gradually died, owing to the improvement in the circumstances of the people which followed the repeal of the corn laws. The principles of the charter were not new, and since then the chief points have become law, for which consummation a certain amount of credit must be given to this agitation.

The Chartist leaders included Feargus O'Connor, Attwood, Lovett, Stephens, Vincent, Ernest Jones, Thomas Cooper, and others. Consult: *Life of Thomas Cooper: An Autobiography* (London, 1880); Carlyle, *Chartism* (London, 1839); Kingsley, *Alton Locke* (London, 1856); and Gammage, *History of the Chartist Movement* (London, 1894).

CHARTISTS. See Chartism.

CHARTRAN, shär'träN', Théobald (1849—). A French painter, born in Besançon (Doubs). He was a pupil of Cabanel. In 1872 he exhibited at the Salon his first picture, "Le corps de Monseigneur Darboy exposé en chapelle ardente au palais de l'archévêque de Paris," which was much praised. In 1877 he obtained the Prix de Rome. Afterwards he painted religious and historical pictures and many portraits. His coloring is always fine, and his portraits have a characteristic distinction.

CHARTRES, shär'tr' (Med. Lat. *Carnotum*, Lat. *Carnutum civitas*, Gall. *Autricum*). A city of France, capital of the Department of Eure-et-Loir, and seat of a bishopric, 47 miles southwest of Paris (Map: France, H 3). It is built partly at the base, and partly on the declivity of a hill overlooking the river Eure, here divided into two channels, one flowing within and the other without the former ramparts, which have been converted into agreeable promenades. Chartres consists of an upper and a lower town connected by streets almost inaccessible to carriages. The upper town has some good streets, but the lower is ill-built. Many of the houses are quaintly gabled, timbered buildings. The cathedral, one of the largest and most imposing ecclesiastical structures in Europe, with its lofty spires, one of them towering to a height of 413 feet, crowns the top of the hill. It has numerous stained windows, the workmanship of which is unsurpassed, if indeed equaled, elsewhere in France, and many of them date from the Thirteenth Century. It is also famous for its sculptures. This splendid edifice was the source of inspiration for James Russell Lowell's poem "The Cathedral." The Church of Saint Pierre and the obelisk to the memory of General Marceau are also objects of interest. Chartres has manufactures of woolens, hosiery, and leather, and is the great cattle and grain market of the department. It has two teachers' colleges, a lyceum, a library of 80,000 printed volumes and 1796

MSS., a museum, and a botanical garden. Population, in 1901, of town, 19,232; of commune, 23,431. Chartres, founded by the Carnutes and the seat of the College of Druids, is one of the most ancient cities of France. In mediæval times it was the capital of the fertile Province of Beauce, and on several occasions was besieged by Normans and Burgundians. Francis I. conferred upon it the dignity of a duchy, and the title since 1661 has been connected with the Orleans family. Chartres suffered during the religious wars, was captured by Henry IV. in 1591, and witnessed his coronation in 1594. In 1870 it was occupied by the Germans, and formed their base of operations against the Army of the Loire. Consult: Doyen, *Histoire de Chartres* (2 vols., Chartres, 1786); Duval, *La cathédrale de Chartres* (Paris, 1867); Joanne, *Chartres* (Paris, 1887).

CHARTRES, Robert Philippe Louis Eugène Ferdinand d'Orléans, Duke of (1840—). A French soldier, the second son of the Duke of Orleans (died 1842), and the grandson of Louis Philippe. He was born in Paris, but when only eight years of age was driven into exile by the Revolution of 1848, and subsequently lived in Germany and England until 1858, when he entered the military school in Turin, Italy. In 1859 he served in the campaign against Austria, and in 1861 came to America with his elder brother Louis, Count of Paris (q.v.), entered the Federal Army, and served on General McClellan's staff during the Peninsular campaign. He returned to England in 1863 and there, in the following year, married his cousin, the eldest daughter of the Prince de Joinville. After the Revolution of September 4, 1870, in France, he served in General Chanzy's army under the pseudonym of 'Robert le Fort,' and before the close of the war had risen successively to the ranks of captain and chief of squadron. He became chief of squadron in the Chasseurs d'Afrique, under his own name, in 1870, served in Algeria, and was appointed colonel of chasseurs in 1878, but in 1883 was suspended from the active service. Three years later his name was stricken from the army list in pursuance of the law of that year which excluded members of royal families from serving in the army or the navy. He published *Souvenirs de voyages* (1869).

CHARTREUSE, shär'trēz'. A famous liqueur (q.v.), so called from the fact that it is made at the celebrated Carthusian monastery, La Grande Chartreuse, near Grenoble. Three qualities are made, green, yellow, and white, the green being the richest and most delicate in flavor. Chartreuse is said to be a most complex product, resulting from the maceration and distillation of balm leaves and tops as a principal ingredient, with orange-peel, dried hyssop-tops, peppermint, wormwood, angelica seed and root, cinnamon, mace, cloves, Tonquin beans, *Calamus aromaticus*, and cardamoms.

CHARTREUSE, La Grande. A celebrated monastery in France, near Grenoble, in the wild and romantic valley of the Guiers, 3205 feet above the sea. It owes its origin to Saint Bruno, the founder of the Carthusian Order (close of Eleventh Century), which took its name from a neighboring hamlet. The present convent is a huge structure of no architectural beauty, dating mostly from 1656, earlier buildings having been destroyed several times by fire. The whole neighborhood at one time belonged to the monks, but they were despoiled by the Revolution. At Fourvoirie, about four miles down the valley, they manufacture the celebrated liqueur which takes its name from the monastery. See Bruno, Saint; Carthusians; and consult Dubois, *La grande Chartreuse* (Grenoble, 1846).

CHARTREUSE DE PARME, dė pärm, La. The title of a French novel (1839), by Stendhal (Henri Beyle), presenting an admirable picture of life at one of the petty courts of Italy after the downfall of Napoleon.

CHARTULARY, kär'tů-lā-rĭ (Lat. *chartularia*, from *charta*, a paper). A collection of charters. So soon as any body, ecclesiastical or secular, came to be possessed of a considerable number of charters, obvious considerations of convenience and safety would suggest the advantage of having them classified and copied into a book or roll. Such book or roll has generally received the name of a chartulary. Mabillon traces chartularies in France as far back as the Tenth Century, and some antiquarians think that chartularies were compiled even still earlier. But it was not until the Twelfth and Thirteenth centuries that chartularies became common. They were kept not only by all kinds of religious and civil corporations, but even by private families. Many of them have been printed. The name 'chartulary' was also applied in western Europe to a registrar or keeper of records, who was known as 'chartophylax' in the Eastern Church and Empire.

CHARYBDIS, kȧ-rĭb'dĭs. See Scylla and Charybdis.

CHARYLLIS, kȧ-rĭl'ĭs. A character in Spenser's *Colin Clout's Come Home Again*, meant to represent Lady Ann Compton, daughter of Sir John Spenser of Althorpe.

CHASE, George (1849—). An American legal writer. He was born in Portland, Maine, graduated at Yale in 1870, and at the Columbia Law School in 1873. He became assistant professor of municipal law at Columbia in 1875, and in 1878 professor of criminal law, torts, and procedure. In 1891 he became dean of the New York Law School. He has edited Chase's *Blackstone's Commentaries* (1876); Stephens's *Digest of the Law of Evidence* (1886); and Johnson's *Ready Legal Adviser* (1881).

CHASE, Philander (1775-1852). A Protestant Episcopal bishop and educator. He was born in Cornish, N. H., graduated at Dartmouth in 1795, and was ordained a deacon of the Protestant Episcopal Church in 1798. He labored as a missionary in western New York, and in 1811 became rector of Christ's Church, Hartford, Conn. In 1817 he went to Ohio, where two years later he laid the foundation of Kenyon College and Gambier Theological Seminary, of which he was first president. In 1835 he became Bishop of Illinois, where he was instrumental in founding Jubilee College, at Robin's Nest. Among his works are: *A Plea for the West* (1826); *The Star in the West, or Kenyon College* (1828); *Reminiscences* (1848).

CHASE, Pliny Earle (1820-86). An American scientist. He was born in Worcester, Mass., and educated at Harvard University, graduating in 1839. He engaged in teaching and business in Philadelphia until 1871, when he became professor of logic and philosophy in Haverford College. He investigated many problems in physics and celestial mechanics, and was the author of *Elements of Meteorology* (1884). For an investigation on gravity he received the Magellanic gold medal of the American Philosophical Society, in 1864, and was a vice-president of this organization, as well as a member of many scientific societies, both European and American.

CHASE, Salmon Portland (1808-73). An American statesman. He was born in Cornish, N. H., January 13, 1808, and was a nephew of Bishop Chase, who supervised his earlier education in Ohio. He graduated at Dartmouth College in 1826, opened a school for boys in Washington, D. C., where he studied law under William Wirt; was admitted to the bar in 1830, and began to practice in Ohio, where almost his earliest work was the preparation of an edition of the statutes of Ohio with annotations, and a sketch of the history of the State. This work assisted him in gaining practice, and in 1834 he was appointed solicitor in Cincinnati for the Bank of the United States. His first effort in a cause touching slavery was in defense (1837) of a colored woman claimed as a fugitive, and of James G. Birney (q.v.) for harboring her. This was the celebrated Matilda case. He maintained that the Fugitive Slave Law (q.v.) of 1793 was void, because unwarranted by the Federal Constitution, and argued that slavery was a local institution; and that, as the slave had been brought into a free State by her master, she was in fact free. In 1847, in the Van Zandt case, before the United States Supreme Court, he took the ground that under the Ordinance of 1787 (q.v.) no fugitive from service could be reclaimed from Ohio unless he had escaped from one of the original thirteen States; that it was the understanding of the framers of the Constitution that slavery was to be left to the disposal of the several States, without sanction or support from the Federal Government; and that the clause in the Constitution relating to persons held to service was a compact between the States, conferring no power of legislation on Congress and never being intended to confer such power. Chase also took part in many other cases involving the constitutionality of the Fugitive Slave Law and came to be known among the slave-holders of Kentucky as the 'attorney-general of fugitive slaves.' Being in active correspondence with editors, clergymen, and politicians engaged in the anti-slavery movement, he soon became a recognized leader of the cause in Ohio. Although favoring the abolition of slavery, he differed radically from Garrison both as to methods of effecting that end and as to the relation of such movements to the existing law of the land. He voted for Harrison in 1840; but after the death of the President, when it became clearly apparent that the Whig Party could never be made a party of freedom, he withdrew from it in 1841, and was thereafter prominent as a member of the Liberal Party in Ohio, which he helped to organize. He took part in the National Liberty Convention in Buffalo in 1843, and subsequent conventions, until the nomination by the Free-Soilers (in 1848) of Martin Van Buren for President; was a leading member, and in most cases directed the proceedings. He was frequently called upon to prepare formal addresses and platforms for his party, and, in particular, was the author of the Liberty Platform of 1843, the Liberty Address of 1845, the resolutions of the People's Convention of 1847, and the Free Soil Platform of 1848. In February, 1849, he was chosen United States Senator from Ohio, his vote coming from all the Democrats and from a few of the Free Soil members. In the Senate he was an outspoken opponent of slavery extension, and he refused to accept Clay's compromise measures in 1850. Though under obligations to no one party for his election, he usually acted with the Democrats, until the nomination, in 1852, of Pierce on a strongly pro-slavery platform, when he withdrew and undertook the formation of an independent Democratic Party.

Remaining in the Senate entirely independent of party relations, he became, even at the side of Sumner and Seward, the leader in the opposition to the Kansas-Nebraska Bill (q.v.), and, acting with Giddings and Sumner, he sent out the historic "Appeal of the Independent Democrats." In 1855 the 'anti-Nebraska' elements in Ohio fixed upon him as their candidate for Governor, and, after a vigorous and close contest, he defeated the candidate of the Old Democrats, and brought Ohio into line as a probable Republican State in the campaign of 1856. In that year Chase was put forward as a candidate for the Republican nomination for the Presidency, but he withdrew his name. In 1857 he was reelected Governor of Ohio, and became recognized thenceforth as a leader in the new national party. During his service as Governor he was much occupied with matters connected with the slavery problem, and at the expiration of his term he was (in February, 1860) elected again to the Senate for the term beginning March 4, 1861. He was one of the candidates for the Republican nomination for the Presidency in 1860, and, failing to secure it, he was later appointed by Lincoln Secretary of the Treasury. In that office, which he held until June, 1864, when he resigned owing to differences between himself and President Lincoln, Chase rendered important public service. The maintenance of national credit and the supply of funds with which to prosecute the war, the provision and regulation of a currency system, the creation of a national banking system, and the administration of a national finance under conditions never before experienced or anticipated, mark these years as the most important in the history of the department, and distinguish Chase as one of the great Secretaries of the Treasury.

In the autumn of 1864 Chief Justice Taney died, and Chase was appointed as his successor in December of that year, retaining the office through a period in which were handed down a series of decisions second in importance only to those of Marshall. Chase dissented from the court's decision in the Milligan Case and in the so-called Slaughter-House Cases; he wrote the decision in Hepburn vs. Griswold, which held that the Legal-Tender Act, so far as it compelled the acceptance of paper money in payment of debts antedating the statute which provided for such money, was unconstitutional. The effect of this was naturally to disprove an important part of Chase's work as Secretary of the Treasury; and this decision against his own work was soon afterwards, in the Legal-Tender Cases, reversed by a slightly reorganized court. He also wrote the opinion in the case of Texas vs. White, in which the nature of the Union and the effect thereon of the Civil War were clearly expounded, the nation being characterized as "an indestructible Union composed of indestructible States." As Chief Justice, Chase presided over the impeachment trial of President Andrew Johnson. He became separated from the Republican Party, and was in 1868 a candidate for the Democratic nomination for the Presidency, while his willingness to secure the same nomination in 1872 emphasized the weakness of his position. There is no doubt that as early as 1864 he had set his heart upon a Presidential nomination, and that he had to some extent intrigued against Lincoln, even while sitting in his Cabinet. In 1870 he was stricken with paralysis, from the effects of which he died, May 7, 1873, in New York. For his biography, consult: Warden (Cincinnati, 1874), a work undertaken at Chase's own request; Schuckers (New York, 1874); and for the most recent and authoritative "Life," Hart (Boston, 1899), in the "American Statesmen Series."

CHASE, Samuel (1741-1811). An American jurist, one of the signers of the Declaration of Independence. He was born in Somerset County, Md., studied law in Annapolis, was admitted to the bar in 1761; soon attained a considerable practice; and became prominent in colonial politics. He served for more than twenty years in the General Assembly of Maryland; was prominent as one of the 'Sons of Liberty' during the Stamp Act excitement; was one of the framers of the 'Declaration of Rights of Maryland;' and from 1774 to 1778 was a member of the Continental Congress. In 1775 he was associated with Franklin and Carroll in an unsuccessful mission to secure the good will of Canada, and soon after his return advocated and signed the Declaration of Independence. As agent for the State of Maryland, he went to England in 1783 to recover the value of stock held by it in the Bank of England before the outbreak of the war, and after remaining a year succeeded in obtaining about $650,000. In 1788 he was a member of the convention which ratified the Federal Constitution for Maryland, but was himself, along with Luther Martin, opposed to that document. He was appointed Judge of the General Court of Maryland in 1791, and Judge of the Criminal Court for Baltimore County in 1793, and in 1796 became, by Washington's appointment, an associate justice of the United States Supreme Court. He presided over the trials of Thomas Cooper, John Fries, and Thomas Callender in 1800, and conducted the two latter with such asperity and apparent favoritism that the counsel for the defendants indignantly withdrew. As a judge, though frequently presiding with firmness and ability, he was unable to suppress or conceal his decided political predilections, and on various occasions, notably in Baltimore on May 2, 1803, delivered what his political opponents regarded as partisan harangues to the grand jury. This harangue in Baltimore attracted the notice of prominent Democrats, who were then engaged in a general movement to diminish the influence of the judiciary, and, on John Randolph's motion, the House of Representatives passed a resolution of impeachment in 1804. In the following year the trial was conducted with much ceremony before the Senate, Chase being represented by Luther Martin, R. G. Harper, Charles Lee, P. B. Key, and Joseph Hopkinson, and the prosecution by John Randolph, G. W. Campbell, Joseph Nicholson, C. A. Rodney, John Boyle, Peter Early, and Christopher Clark. By the latter, eight articles were exhibited, two setting forth Chase's oppressive treatment of Fries, two more charging similar treatment of Callender, two others charging an infringement of the laws of Virginia in the Callender case, one relating to alleged unbecoming and unfair conduct before a Delaware grand jury, and the last calling Chase to account for his harangue before the Baltimore grand jury. Chase was finally acquitted on all but two charges—partisanship in the Callender trial and 'electioneering' before the Baltimore grand jury—and no article received the two-thirds vote requisite for impeachment. This decision has been regarded as of considerable significance in the history of the American judiciary, serving as it did to discountenance impeachment trials unless based on really serious grounds, and at the same time warning judges to suppress all manifestations of partisanship on the bench. After the trial, until his death, Chase continued to serve as a member of the Supreme Court. Consult an article "The Impeachment Trial of Judge Samuel Chase" in the *American Law Review*, Vol. XXXIII. (Saint Louis, 1889), and Smith and Lloyd (reporters), *The Trial of Samuel Chase* (Washington, 1805).

CHASE, Thomas (1827-92). An American educator, born in Worcester, Mass. He graduated in 1848 at Harvard University, studied at the University of Berlin and the Collège de France, and was professor of Greek and Latin at Haverford College in 1855-75. From 1875 to 1886 he was president of Haverford. He was a member of the American committee for the revision of the New Testament, and a delegate to the Stockholm Philological Congress of 1889. He published *Hellas: Her Monuments and Scenery* (1863), a *Latin Grammar* (1882), and editions (1881) of *Cicero on Immortality* (1868), *The Æneid* (1869), Horace (1872), *Four Books of Livy*, and (1876) Juvenal and Persius.

CHASE, William Merritt (1849—). An American painter. He was born in Franklin, Ind., November 1, 1849. After studying under B. F. Hays, in Indianapolis, and in the schools of the National Academy of Design, he painted with Piloty and Wagner at Munich (1872), acquiring a thoroughly German method, which at that time was bituminous and dark. On his return to New York (1878) he began to change his style of painting, gradually clarifying his color and showing an appreciation for the work of the French school. One of the most facile and brilliant technicians of the American school, Chase succeeds equally well with figure, portrait, and still life. He himself considers his best work to be still life, of which remarkable examples are one in the Pennsylvania Academy and an "English Cod" lately exhibited. Other well-known works are "A Broken Jug," "Ready for a Ride" (1878, Union League Club, New York), "Alice" (Art Institute, Chicago), and a "Lady in Black" (Metropolitan Museum, New York). He has received many medals, is a National Academician, and has been president of the Society of American Artists.

CHASIDIM, kä-sē′dĭm (Heb., saints). A name employed at different periods of history to designate a sect of Pietists among the Jews. (1) Beginning in the time of the high priest Simon the Just (B.C. 300-270), a sect of Jews arose which was distinguished by its strict observance of ceremonial regulations. They firmly opposed all Hellenizing tendencies, and clung closer and closer to the ceremonies of Judaism. The members even suffered death in preference to transgressing the rites of their religion. They carried out to the letter the Sabbath laws and incurred loss and personal danger rather than extinguish a fire on that day; but they were no less stringent in carrying out the purely ethical features of the law, and were noted for their kindness and charity. Under Mattathias, the Hasmonean, they took part in the Jewish wars for independence, and were keen patriots, although lacking the ardor and spirit of the Hasmoneans themselves. In the days of John Hyrcanus, when Judæa was again independent, the Pietists withdrew into a life of retirement, and became the sect of Essenes (q.v.), while those of the Chasidim who were not willing to resign participation in political affairs branched off into the sect of Pharisees (q.v.). These Chasidim are mentioned in the Apocrypha (cf. I. Mac. ii. 42), as 'Asidæans' or 'Hasidæans.' Consult Hamburger, *Realencyklopädie für Bibel und Talmud*, Vol. II. (Leipzig, 1896).

(2) In modern times the name Chasidim is applied to a sect which originated in Poland under the leadership of Israel of Miedziboz (died 1759), and after his death of Beer of Mizricz (died 1772). Israel was called 'Baal Shem,' 'master of the name,' because he professed to perform miracles by using the name of God, and the sect that followed him was characterized by a belief in miracles, and in the approach of the coming of the Messiah. They opposed Talmudic learning, because their leader was not a Talmudist. Their worship became characterized by its noisiness and the almost frenzied gyrations of its devotees. Beer was dignified with the title 'Zaddik' (righteous), and claimed to represent God upon earth. The members of the sect formed a kind of fraternity, and it spread rapidly, numbering about fifty thousand in 1770. The new division provoked great opposition on the part of the Talmudists, and in 1781, in Vilna, the Chasidim were declared to be heretics, but the sect continued to flourish, and today has a large number of adherents. With their antipathy to the Talmud on the one hand, the Chasidim combine an aversion to all modern culture on the other, their literature consisting of mystical, cabalistic works. Consult Schechter, *Studies in Judaism* (New York, 1896).

CHASING (short form of *enchase*; Fr. *enchâsser*, from *en* + *châsse*, frame, OF. *casse*, It. *cassa*, Cat., Lat. *capsa*, case, from *capere*, to hold). The art of working in metals by indenting. This is an art of very early times, and was practiced largely by the Greeks in ornamenting the draperies and costumes of religious figures for the temples. It is produced by punching from behind the general character of the design, which is afterwards perfected by chiseling the details. This results in a kind of embossed engraving, often of great richness. The favorite metal used for this purpose was silver, although gold, and in very early times even iron, was thus ornamented. That the art was known at a very early period may be inferred from the shield of Achilles, the ark of Cypselus, and other productions of the kind. Such portions of the colossal statues made by Phidias and Polycletus as were not of ivory were produced by this art. The statue of Athena was richly adorned in this manner. Besides Phidias and Polycletus, Myron, Mys, and Mentor were celebrated toreutic artists in antiquity, and among many moderns the most famous is Benvenuto Cellini.

CHAS′KA. A city and county-seat of Carver County, Minn., 22 miles southwest of Minneapolis, on the Minnesota River, and on the Minneapolis and Saint Louis and the Chicago, Milwaukee and Saint Paul railroads (Map: Minnesota, E 6). It is the seat of an extensive brick-making industry, and has also a flour-mill, creamery, foundry and machine shops, etc. Population, 1890, 2210; 1900, 2165.

CHASLES, shȧl, MICHEL (1793-1880). A French mathematician. He was born at Epernon, entered the Ecole Polytechnique, of Paris, in 1812, took part in the defense of Paris in 1814, and reëntered the school in the following year. At graduation he secured the much coveted promotion to a commission in the engineer corps, but resigned it, with rare generosity, to allow one of his fellow classmates to take the place, retiring to Chartres for the purpose of studying geometry. For a quarter of a century Chasles devoted the leisure which his wealth afforded to a profound study of this science. After a perusal of the works of Lagrange or Laplace, he read Apollonius and Archimedes, and sought to clarify the obscure passages of Pappus. Chasles's classical work, *Aperçu historique sur l'origine et le développement des méthodes en géométrie* (1837, 2d ed., 1875), while modest in title, is powerful in exposition, clear in style, and rich in ingenious comparisons. In 1841 he was made professor of geodesy and mechanics at the Ecole Polytechnique, and in 1846 professor of geometry at the Sorbonne, which chair he occupied for twenty-one years. The appendix to the *Aperçu historique* contains the general theory of homography and reciprocity. Synthetic or projective geometry was elaborated by him, as was also the 'method of characteristics,' the basis of enumerative geometry afterwards extended by Schubert to *n*-dimensional space. Chasles contributed also some valuable propositions to integral calculus; his discussions of the displacement of solid bodies and of static electricity have become classics in the field of science, and his solution (1845) by projective geometry of the difficult problem of the attraction of an ellipsoid on an external point is noteworthy. The words of an illustrious Englishman, "M. Chasles is the emperor of geometry," rightly suggest his title to fame.

It is not an uninteresting fact that Chasles was duped by the notorious forger Vrain Lucas. In 1867 Chasles announced that he was in possession of 27,000 letters and documents of great value; among them were papers believed to have been written by Dante, Petrarch, Rabelais, Julius Cæsar, and Shakespeare, as well as some by Pascal, which were intended to prove that Pascal had anticipated some of the greatest discoveries of Newton. Scarcely one hundred of them proving genuine, Chasles suffered not only the embarrassment of being deceived, but also the loss of his expenditure of 200,000 francs.

Among the chief works of Chasles are, besides the *Aperçu historique* mentioned above, the following: *Traité de géométrie supérieure* (1852; 2d ed. 1880); *Traité des sections coniques* (1868-76); *Rapport sur les progrès de la géométrie* (1871); and *Trois livres de porismes d'Euclide* (1863). His various memoirs on perspective and projective figures, duality, tortuous curves, and the principle of correspondence were published in the *Journal de l'Ecole Polytechnique* (1840-65).

CHASLES, Victor Euphémien Philarète (1798-1873). A French literary critic, born at Mainvillers (Eure-et-Loir). He studied at the Lycée Imperial, and went to England, where he assisted in the preparation of an edition of Greek and Latin authors. In 1837 he was appointed curator of the Mazarin Library, and in 1841 professor of Continental languages and literatures at the Collège de France. He wrote for periodicals, chiefly the *Journal des Débats* and the *Revue des Deux Mondes*, a large number of articles collected under the title *Esquisses*. His other works include *Oliver Cromwell* (1847); *Galileo Galilei* (1862); *Etudes contemporaines* (1866); and *L'Arétin, sa vie et ses écrits* (1873). His most comprehensive work is *Etudes de littérature comparée*, in about 20 volumes (1847-64), which treats of the literature of antiquity, of the Middle Ages, of Italy, Spain, England, the United States, etc. Two volumes of so-called *Mémoires* were posthumously published (1876-77).

CHASMOGAMY, kăz-mŏg'ȧ-mĭ (Gk. *χάσμα*, *chasma*, opening + *γάμος*, *gamos*, marriage). Flowers which open are said to exhibit chasmogamy, as opposed to cleistogamy, in which case the flowers never open. See Pollination.

CHASMOPHYTES, kăz'mō-fīts. Crevice plants. See Rock Plant.

CHASSÉ, shȧ-sā', David Hendrik, Baron (1765-1849). A Dutch soldier, born at Tiel, Gelderland. He entered the army at an early age, and when the anti-Orange party was crushed by a Prussian army, in 1787, Chassé joined the French ranks and served for a term under Pichegru. He afterwards fought with distinction in the French wars of the Revolution and the Empire, and, for the frequency with which he ordered bayonet charges, was nicknamed 'Général Baïonette.' He was made lieutenant-general for his services in the passes of the Pyrenees. After the conclusion of peace he entered the Dutch Army, and served with great gallantry on the field of Waterloo. During the Belgian Revolution Chassé commanded the citadel of Antwerp, and bravely defended it against an overwhelming force of Belgians and French, from November 29 to December 23, 1832, when he was forced to surrender.

CHASSELOUP-LAUBAT, shȧs'lōō'lō'bȧ', François, Marquis de (1754-1833). A French military engineer, born at Saint Sornin (Charente-Inférieure). Having risen to be colonel, he rendered valuable services to the Republic. He defended Montmédy in 1792, conducted the engineering operations at Maestricht in 1794, and in 1796 served as chief of engineers in the Army of Italy under Bonaparte, by whom he was promoted to be brigadier-general of engineers. From this time until 1812 he repeatedly served as head of the engineer corps of the Napoleonic armies. In 1815 he declared for Louis XVIII. He wrote *Essais sur quelques parties d'artillerie et des fortifications* (1811).

CHASSELOUP-LAUBAT, Justin Napoléon Samuel Prosper, Marquis de (1805-73). A French politician, son of the preceding. He entered the Chamber of Deputies in 1837, and afterwards became Councilor of State. In the Legislative Assembly of 1849 he was a supporter of Louis Napoleon, who in 1851 made him Minister of Marine. After the coup d'état he was elected to the Corps Législatif. In 1859 he became Minister of Colonies, and gave a marked impulse to French colonization. In 1869 he presided over the Council of State until the accession of Ollivier.

CHASSEPÔT, shȧs'pō'. A kind of breech-loading rifle. The chassepôt derived its name from its inventor, Antoine Alphonse Chassepôt, and was used by the French during the Franco-Prussian War of 1870, but it has since been superseded by the modern Lebel magazine rifle. It was, however, a great improvement on the rifles or guns previously in use, and marked the real commencement of the epoch of needle, breech, and magazine loading firearms generally. The chassepôt had four grooves, and could be fired 12 times a minute. Its range was 1200 yards, and its cartridge had a calibre of .433 inch. See Small Arms.

CHASSÉRIAU, shȧ'sȧ'rā'ō', Théodore (1819-56). A French painter. He was born on the island of Samaná, near San Domingo. At the age of thirteen he entered the atelier of Ingres, and at sixteen he had already exhibited in the Salon. At first he painted in the manner of his master, Ingres, but afterwards became an imitator of Delaroche. His masterpiece, the "Tepidarium at Pompeii," now in the Louvre, was first exhibited in 1853.

CHASSEURS, shȧ'sẽr' (Fr., from *chasser*, to hunt, chase). A branch of the military forces of France. Before the era of railroads, long-range and rapid-fire artillery and rifles, light cavalry and light infantry were much used, and were very necessary, for service in advance or on the flanks of the army. They were designed and equipped for greater mobility than was possible for the army as a whole, and were very generally adopted throughout Europe at large, under various titles. The English Rifles and Light Infantry, Prussian and Austrian Jäger, and later the Italian Bersaglieri, were all of this type, and while they still retain their former titles, the characteristics that once distinguished them have, in the evolution of the science of warfare, of necessity become general.

Every modern soldier must be a good shot, a marksman or sharp-shooter if possible; and in every branch and detail mobility itself. The chasseurs, who derive their name (Fr., hunter) from the same source as the Prussian Jäger, are divided into two branches: the mounted chasseurs (*chasseurs-à-cheval*), or light cavalry, and the dismounted chasseurs (*chasseurs-à-pied*), or light infantry. After the reorganization of the French Army in 1873 there were twenty regiments of *chasseurs-à-cheval*, besides four regiments of *Chasseurs d'Afrique* (regiments raised and equipped for special service in Africa), and thirty battalions of *chasseurs-à-pied*.

CHASTELAIN, shȧ'tläN', Georges (c.1405-75). A French chronicler and poet, born in Flanders. He became attached to the Court of the Duke of Burgundy, Philip the Good, in the character of chronicler, and served Charles the Bold in the same capacity. His chronicle of the times, *Chronique des choses de ce temps*, is more valuable than many of such writings, on account of its veracity, although naturally he is partial to his patrons.

CHASTELARD, shȧ'tlär'. A dramatic poem by Algernon Charles Swinburne, published in London in 1865, and in New York in the same year. Later editions appeared in the former place in 1866, 1867, and 1868. It is founded on the love of a French page for Mary, Queen of Scots; but the historic facts are treated with some license.

CHASTELARD, Pierre de Boscosel (1540-63). A French poet at the Court of Francis II. and his young wife, Mary, whom he afterwards accompanied as page of Damville (1561) to Scotland, where his indiscreet love invited, and at last almost compelled, his execution. He it was who carried to Mary the famous *Regrets* of his poetic master Ronsard. Chastelard and the Queen exchanged also amorous verses of their own composition. His last words are said to have been a profession of undying love. Consult Swinburne, *Chastelard: A Tragedy* (London and New York, 1865).

CHASTELER, shȧ'tlā'. Jean Gabriel Joseph Albert, Marquis de (1763-1825). An Austrian general. He was born in Belgium, received his military education in Vienna, and entered the Austrian service. He took a prominent part in the campaigns against the Turks in 1789 and those against France during the Revolution, and especially distinguished himself at Wattignies in 1793. He fought in the Tyrol against Napoleon, but was beaten by Lefebvre, at Wörgl in 1809, and was compelled to fly to Hungary. When the Lombardo-Venetian kingdom was established, he was made Governor of Venice.

CHASTELLUX, shȧ'tlụks'. François Jean, Marquis de (1734-88). A French soldier and writer. He was born in Paris, entered the French Army in 1749, distinguished himself in the Seven Years' War, and from 1780 to 1782 served as a major-general in the French army, under Rochambeau, which coöperated with the Americans against the English in the Revolutionary War. After his return to France until his death he held the position of inspector of infantry, and in 1786 he became a marquis by the death of an elder brother. His reputation rests chiefly upon his *Voyages dans l'Amérique septentrionale, dans les années 1780, 1781 et 1782* (1786; Eng. translation by Kent, 1787) in which he gives an interesting account of many persons and places connected with the American Revolution and of many localities visited by him in a tour through the Middle States and the northern part of Virginia. For the most part the book has been considered a reasonably accurate picture of the United States at that time, but certain portions of it met with severe criticism, especially at the hands of Brissot de Warville, who wrote an *Examen critique des "Voyages dans l'Amérique septentrionale" dans lequel on réfute principalement ses opinions sur les Quakers, sur les nègres, sur le peuple et sur l'homme* (Paris, 1787). Chastellux also wrote: *De la félicité publique, ou considérations sur le sort des hommes dans les différentes époques de l'histoire* (1772), which was highly praised by Voltaire (who is said to have ranked it above Montesquieu's *Esprit des lois*), but which gave considerable offense to many by its strictures upon Christianity; *De l'union de la poésie et de la musique* (1775); and *Discours sur les avantages et les désavantages qui résultent pour l'Europe de la découverte de l'Amérique* (1787), in which, answering the famous question proposed by Raynal, he asserts that the advantages have greatly outweighed the disadvantages. Consult: Chastellux, *Notice sur le marquis de Chastellux* (Paris, 1822), and Pascallet, *Notice historique sur la maison de Chastellux* (Paris, 1844).

CHASTE MAID IN CHEAPSIDE, A. A comedy by Thomas Middleton (q.v.), printed in quarto (1630) and acted about 1612 at the Swan Theatre, London.

CHASTE TREE. See Vitex.

CHASUBLE, chăz'ṳ-b'l. See Costume, Ecclesiastical.

CHAT (from *chat*, so called on account of its note). Originally one of the Old World ground-keeping warblers or small thrushes of the large sub-family Saxicolinæ, elsewhere described under Wheatear, Whinchat, etc. In America, one of a group of large warblers (Icteriinæ), of which the best known is the yellow-breasted chat (*Icteria virens*), a bird some seven or eight inches long, common in the eastern United States, at least southward. The tail is considerably longer than the wing. The color is olive-green above, bright yellow beneath, fading into white posteriorly. The song is a most extraordinary jumble of whistles, chucks, and caws, and is chiefly uttered when the male is in the air, carrying on aërial evolutions little less remarkable than his song. The chats are insectivorous and are inhabitants of thickets and copses, where they can conceal themselves readily when too closely approached. The nest is built of coarse grass, leaves, and strips of bark, in a bush near the ground, and the eggs, five in number, are white evenly spotted with brown. Consult Abbott, *A Naturalist's Rambles* (New York, 1884).

CHÂTEAU, shȧ'tō', **CHÂTEL**, shȧ'tĕl' or **CASTEL**, kȧ'stĕl' (Fr., castle, from Lat. *castellum*, dim. of *castrum*, camp). Names applied in France and in southern Europe to the residences of the feudal lords of the soil. The name *château-fort* is now applied to the fortified castles, erected before the Fifteenth Century. The term château is also applied to the modern French country house, when the proprietor is also the owner of extensive adjoining landed property. Royal residences, like the Louvre, were also called châteaux, although they were in reality palaces (*palais*). The valley of the Loire contains an unusually large number of châteaux, both royal, as Amboise, Blois, and Chambord, and private, as Chenonceaux, Langeais, Châteaudun, Chaumont, and Azai-le-Rideau. The word is also a component part of many names of places in France. See the bibliography of Castile; consult, also, Petit, *Les Châteaux de la Loire* (Paris, 1861).

CHATEAUBRIAND, shá'tô'brê-äN', FRANÇOIS RENÉ AUGUSTE, Vicomte de (1768-1848). A French author and statesman. He was born in Saint Malo, the most Catholic of French provinces, and the warm piety of his mother and the distant reserve of his father combined with the strange Breton legends and the mysterious vastness of the neighboring ocean to nurse in the child religious sentiment and poetic mysticism. To these elements direction and intensity were given by his education at Dôle and Rennes. At twenty he entered the army, thinking to try his fortune in India, but the Revolution diverted him from this, and in 1790 he obtained a Government commission to seek the Northwest Passage, a quest that took him, according to his own possibly inaccurate account, on wide journeys on the Great Lakes and prairies of America, and even to semi-tropical Florida, and brought him much association with Rousseau-like Indian 'children of nature,' and self-communion in primeval forests. These influences first revealed Chateaubriand to himself, and were revealed in all his future work, but most brilliantly in *Les Natchez*, planned about this time, though unpublished for thirty years, and in the stories that originally were connected with it: the epoch-making *Atala* (1801); and *René* (1802). The excesses of the Revolution modified Chateaubriand's zeal for political reform, and on his return to Europe (1792) after a hasty and unhappy marriage, of his parents' making, he cast his lot with the army of the émigrés. He was wounded at the siege of Thionville (September, 1792), and suffering and in want he went in 1793 to England, where he supported himself for several years by literary work, and wrote the pessimistic and skeptical *Essai sur les révolutions* (1797). Here, too, he elaborated *Atala*, *René*, and *Les Natchez*, inspired partly by Rousseau's *Emile*, partly by Saint Pierre's *Paul et Virginie*. These show a marked change in Chateaubriand's religious attitude, attributed by him to the death of his mother (1798).

That France was ready for a Christian and idealistic reaction the Concordat (July 15, 1801) was about to prove. Returning to France in 1800, he struck a note that set all hearts vibrating. *Atala* was immediately and universally popular. It roused a dormant spirit of romantic idealism, and, in the mental state that it disclosed, anticipated much in Lamartine and Hugo. The eloquent descriptions of nature showed rare powers of minute observation. Chateaubriand immediately took the leading place in French letters and retained it unquestioned till the appearance of Lamartine's *Méditations* (1820). *Le génie du Christianisme* (1802), a brilliant piece of special pleading, suggests that æsthetic rather than moral interests drew Chateaubriand to the Church. At bottom he was still a pessimist and a skeptic, though perhaps as sincere as he could be, for neither rational nor logical consistency was a dominant characteristic in him. The author of the *Génie*, and its readers also, were less interested to find that Christianity is true than that it is sentimentally poetic, pathetic, and æsthetic.

Chateaubriand, whose apotheosis of Christianity fell in with Napoleon's plans at this time, received a diplomatic post in Rome (1803). He was involved in intrigues, was transferred to Switzerland, and on the execution of the Duc d'Enghien (1804) resigned and began a campaign of criticism against Napoleon, who, he said, "made the world tremble, but me—never." In 1806 he started on an extensive tour in the East, visiting Greece, Turkey, Asia Minor, Palestine, Tunis, and Spain. He embodied his impressions in *Les martyrs* (1809), a prose epic of rising Christianity and sinking paganism; in *Les aventures du dernier des Abencérages* (1826), a Moorish story, and in *Itinéraire de Paris à Jérusalem* (1811), all showing "opulence of imagination and poverty of heart." The fall of Napoleon evoked *De Buonaparte et des Bourbons* (1814), which, according to Louis XVIII., was worth 100,000 men to the Legitimist cause. The work brought its author several diplomatic appointments, which he resigned in order to be free to oppose ministries that displeased him, until toward 1830 he seemed tending to liberalism. The Orléanist triumph brought him back promptly to the lost cause. Chateaubriand now sank into a discouraged silence. He translated *Paradise Lost* (1836), wrote a *Vie de Rancé*, the ascetic (1844), and revised and completed his *Mémoires d'outre-tombe*, published a little prematurely, just before his death (1848), and translated (1902). This is a work of some historic interest, great eloquence, remarkable prejudices, and unique self-conceit—"*René* with documentary evidence," as it has been wittily called. For Chateaubriand is his own René, and in *René* lies his literary significance.

René and *Atala* mark the beginning of the Romantic School. They are to France what Goethe's *Werther* is to Germany, the germ of the so-called *maladie du siècle*, a dilettant, morbid, introspective pessimism that was to infect Senancour, Lamartine, Vigny, Musset, and the youthful work of Sainte-Beuve, Dumas, and George Sand. It can be traced also, masked by stronger powers, in Hugo and in Byron. This moral influence, the helpfulness of which has been questioned, was accompanied by very great services to art. Chateaubriand was the first in France to draw attention to the literary resources of the Middle Ages and Christian antiquity. He was a renovator in imagination, criticism, history, and the founder of the new descriptive school of idealization and personification of nature, and thus as much the father of Loti as of Thierry and Michelet. He made literature national in aspiration, Christian in spirit; he persuaded his generation to break with the imitation of imitation that had sapped the literary life of the Eighteenth Century. His style left its mark on poetry, history, fiction, on the very language. His effect on morals and religion has been considered morbid and transitory. In literary art he marks an era. Châteaubriand's works were edited by Sainte-Beuve (1859-60). Consult also: Sainte-Beuve, *Chateaubriand et son groupe littéraire* (Paris, 1860); Vinet, *Madame de Staël et Chateaubriand* (Paris, 1857); Villemain, *Chateaubriand, sa vie, ses écrits et son influence* (Paris, 1859); Danielo, *Les Conversations de Chateaubriand* (Paris, 1864); Bornier, *Eloge de Chateaubriand* (Paris, 1864); France, *Lucile de Chateaubriand* (Paris, 1879); Bardoux, *Chateaubriand* (Paris, 1893); Faguet, *Le XIX. siècle* (Paris, 1887); Leseure, *Chateaubriand* (Paris, 1892); Pailhès, *Chateaubriand, sa femme et ses amis* (Bordeaux, 1896);

Maurel, *Essai sur Chateaubriand* (Paris, 1899); Bertrin, *La sincerite religieuse de Chateaubriand* (1901), and Brunetière, *Evolution de la poesie lyrique*, Vol. I. (Paris, 1894); and *Evolution des genres*, Vol. I. (Paris, 1898); *Memoires d'outre-tombe*, trans. by Teixeira de Maltos (6 vols., New York and London, 1902).

CHÂTEAUDUN, shä′tō′dēɴ′ (Fr. *château*, castle + Gall. *dun*, OIr. *dún*, stronghold). The capital of an arrondissement in the Department of Eure-et-Loir, France, situated on the Loir, about 28 miles from Orleans (Map: France, H 3). The town contains an old castle, with an enormous tower, a number of houses dating from the Fourteenth, Fifteenth, and Sixteenth centuries, a college, and a library. Population, in 1901, of town, 5562; of commune, 7146. During the Middle Ages Châteaudun was the residence of the Counts of Dunois; it was burned by the Germans in 1870. Consult *Un coin de l'ancien Dunois* (Châteaudun, 1869).

CHÂTEAUGAY, shăt′ō-gā′, BATTLE OF. An engagement on October 25, 1813, at the junction of the Chateaugay and Outarde rivers in New York State, between 1000 English, strongly intrenched, and about 4000 Americans, the latter being defeated, owing to the incapacity of their leader, General Hampton, who brought less than half of his troops into action. The loss of the Americans was 38, that of the British, 25.

CHÂTEAUNEUF DE RANDON, shä′tō′nēf′ de räɴ′dōɴ′ (Fr., Castle of Randon, the hill on which it is situated). A village of France, in the Department of Lozère, 12 miles northeast of Mende, celebrated in connection with an incident of the Hundred Years' War. In 1380 the fortress, then held by the English, was besieged by the troops of Charles V., under the command of the gallant Du Guesclin. The English governor, hard pressed, promised to yield in fifteen days, if no succor arrived. In the meantime, Du Guesclin died, and his successor at the end of the fifteen days summoned the governor to surrender. He refused to give the keys to any one except Du Guesclin; and when told that he was dead, marched out, and on bended knee laid the keys and his sword on Du Guesclin's bier. A monument commemorating the death of Du Guesclin was erected in 1820.

CHÂTEAURENAULT, shä′tō′re-nō′, **CHÂTEAURENAUT**, -re-nō′, or **CHATEÂUREGNAUD**, -re-nyō′, FRANÇOIS LOUIS ROUSSELET, Marquis de (1637-1716). A French vice-admiral. In 1673, while in command of five ships, he dispersed a fleet of eight vessels under Admiral de Ruyter in the North Sea, and in 1677 with six vessels he defeated a Dutch fleet of twenty-five vessels under Admiral Evertzen off the coast of Spain. He was also commander-in-chief of the fleet sent to Ireland by Louis XIV. to support the cause of James II. He became a marshal of France in 1703.

CHÂTEAUROUX, shä′tō′ro͞o′ (named in honor of Prince Raoul of Déols, who founded it in the Tenth Century). A town of France, capital of the Department of Indre, situated on the left bank of the river Indre, 166 miles south of Paris by railway (Map: France, H 5). The town, which was formerly dirty and ill built, has been greatly improved within the last few decades. Its gloomy castle on a hill above the river was the prison of Cardinal Richelieu's niece, the Princesse de Condé, during 23 years. The town has extensive factories of woolen and cotton goods, hosiery, yarn, hats, paper, parchment, hardware, tobacco, and leather. Population, in 1901, of town, 21,058; of commune, 24,957.

CHÂTEAUROUX, MARIE ANNE, Duchesse de (1717-44). A daughter of Marquis de Nesle and favorite of Louis XV. She was born in Paris, and after the death of her husband, Marquis de la Tournelle, succeeded her three sisters as the favorite of Louis XV. of France, who made her the Duchess of Châteauroux (1743). During the war of 1744 she accompanied the King as far as Metz, where he was taken ill, and was prevailed upon by the Bishop of Soissons to dismiss her. Upon his return to Paris, however, she consented to a reconciliation on condition that her principal enemies at Court should be banished. She died soon afterwards, probably through violence. Consult Gay, *Madame la duchesse de Châteauroux* (Paris, 1839).

CHÂTEAU-THIERRY, shä′tō′tyâr′rē′ (named in honor of Theuderich or *Thierry* IV., for whom it was founded by Charles Martel in the Eighth Century). The capital of an arrondissement in the Department of Aisne, France, situated on the river Marne, 59 miles from Paris by rail. Its chief buildings are a commercial college, a public library, an old cathedral, and ruins of a castle erected in the Eighth Century (Map: France, K 3). It has manufactures of musical instruments and woolen yarn. Population, in 1901, of town, 6501; of commune, 7083. The position of Château-Thierry has subjected it to many disasters. It was captured by the English in 1421, by Charles V. in 1545, by the Spanish in 1591; was pillaged in the Fronde wars in 1652, and suffered severely in the Napoleonic campaign of 1814. Château-Thierry was the birthplace of La Fontaine. Consult Poquet, *Histoire de Château-Thierry* (Château-Thierry, 2 vols., 1839-40).

CHÂTEAUX EN ESPAGNE, äɴ nä′spä′ny′ (Fr., castles in Spain). Romance castles; castles in the air; day-dreams.

CHÂTELAIN, shä′tläɴ′. See CASTELLAN.

CHÂTELAIN DE COUCY ET DE LA DAME DE FAYEL, shä′tläɴ′ de ko͞o′sē′ ā de lȧ däm de fȧ′yĕl′, HISTOIRE DU (Fr., history of the Châtelain of Coucy and the Lady of Fayel). A French romance founded on the quasi-historical loves of Renaud, Châtelain de Coucy, and belonging to the Thirteenth Century. An edition by M. Crapelet appeared in Paris in 1829. See COUCY, RENAUD, C. DE.

CHÂTELET, shä′tlā′. A town of Belgium in the Province of Hainaut, situated a few miles east of Charleroi on the Sambre (Map: Belgium, C 4). It contains a number of smelting-works and iron-foundries. In its vicinity is the town of Châtelineau with a population of nearly 13,000. Population of Châtelet (1900), 11,867.

CHÂTELET (Fr., a little castle). A fortification placed at the entrance to towns or at the mouth of rivers. The most noted châtelets were the large and small châtelets of Paris. That either one was built by Julius Cæsar is purely mythical; but it would seem that Charles the Bald spoke of them in his capitulary of 887, as a defense against the Normans. The great châtelet situated on the present Place du Châtelet was remodeled in the years 1506 and 1684, became the seat of royal justice for Paris, and continued such until the Revolution of 1789. Officials were added gradually until just previous to the Revolution the list numbered over 700. The first morgue was established under the châtelet in 1363. It was also a noted prison, and although Louis XVI. endeavored to abolish it in 1780, it still contained many prisoners at the opening of the Revolution. In 1802 the large châtelet was demolished to open the way for the Boulevard Sébastopol. The small châtelet situated near the present Hôtel-Dieu was rebuilt in the Twelfth and Thirteenth centuries, and used as a prison in the Eighteenth Century. It was demolished in 1782.

CHÂTELET, Le Grand. A fortress in Paris, said by tradition to have been built by Julius Cæsar, and known to have been in existence in 885 at the Norman siege of Paris. It later became the castle of the Counts of Paris and the centre of the judicial system of the city. As the city prison it was notorious for its treatment of prisoners. It was removed in 1802.

CHÂTELET-LOMONT, shä'tlâ'lô'môɴ', Gabrielle Emilie, Marquise du (1706-49). A French author, born in Paris. She was distinguished for her wit, talent, and learning, especially in mathematics and physics, but chiefly for her intimacy with Voltaire, who was for several years her guest at Cirey, her complacent husband's country seat on the Lorraine frontier. In 1747 she exchanged Voltaire's cooling affections for those of Captain Saint-Lambert, but the philosopher remained her devoted and indulgent friend till her death in childbirth two years later. She translated Newton's *Principia*, with annotations, and wrote on the philosophy of Leibnitz, but her *Correspondance* with Voltaire is the most instructive and interesting of her productions. Consult Capefigue, *La marquise du Châtelet* (Paris, 1868).

CHÂTELLERAULT, shä'tĕl'rô' (Med. Lat. *Castrum Heraldi*, *Castellum Airaldi*, herald's castle). A town of France, capital of an arrondissement in the Department of Vienne, situated on the river of that name, 18 miles north-northeast of Poitiers (Map: France, G 5). A handsome stone bridge, with a massive castellated gateway built by Sully, connects it with a suburb on the other side of the river. Châtellerault, which is an ill-built, mean-looking town, is one of the chief seats of the manufacture of cutlery in France, and since 1820 has had a national manufactory of swords and bayonets, employing nearly 2000 workmen. There are also extensive manufactures of millstones, watches, leather, candles, and lace. Its river-port makes it the entrepôt for the produce of wine, brandy, and prunes of an extensive district. Population, in 1901, of town, 17,962; of commune, 20,801. Consult Lalanne, *Histoire de Châtellerault* (Châtellerault, 1859).

CHATHAM, chăt'*am* (AS. *Cotcham*, village of huts, from *cot*, hut + *ham*, inclosure). A Parliamentary borough, river-port, fortified town, and naval arsenal, in the county of Kent, England, on the estuary of the Medway, 30 miles east-southeast of London (Map: England, G 5). It lies a little to the east of Rochester, with which it is practically united. The streets are generally irregular and narrow, but much has been done to improve this since the incorporation of the town in 1890. It sends one member to Parliament. Its gas and water supply is furnished by private companies, but the municipality has built a pier, established a public park and recreation grounds, constructed a fine new town hall and municipal offices, and expends a considerable sum on technical education. Chatham owes its importance to its naval and military establishments, situated at Brompton village (on a height half a mile north of Chatham). The so-called lines or fortifications which inclose these works are the frequent scenes of field operations, sham fights, and reviews. From a military point of view, the lines of detached forts connected with Chatham, which have superseded for defensive purposes the old 'lines,' constitute a fortification of great strength, and, together with the strong forts erected on the Medway, form an excellent protection to London from invasion from the southeast coast. Chatham is an important military post with large infantry, artillery, and engineer barracks, a school of military engineering, and a large military hospital. As a naval base, it is one of the most important in the kingdom. The royal dockyard, which was first established by Queen Elizabeth, embraces an area of about 500 acres and contains building slips and floating docks in which the largest ships of the navy may be built or repaired. One basin, famous for its size, has a frontage of 6000 feet and a width of 800 feet. At times 5000 workmen are employed. In connection with the yard is a metal-mill which supplies it with copper plates and bolts. Melville Hospital is a large establishment for sailors and marines. There are also extensive barracks for marines. Population, in 1891, 31,700; in 1901, 40,800. Consult "Chatham," in *Municipal Journal* (London, 1900).

CHATHAM. A town in Northumberland County, New Brunswick, on the Miramichi River, near its entrance into Miramichi Bay, six miles northeast of Newcastle (Map: New Brunswick, D 2). It has a Roman Catholic cathedral, a college, hospital, and a temperance hall. It is a port of entry, with a fine harbor, shipyards, foundries, mills, gas-works, and a large export trade in fish, lumber, etc. Population, 5000.

CHATHAM. A town in Kent County, Ontario, Canada, on the Thames River, 45 miles east-northeast of Detroit, Mich., reached by the Grand Trunk Railway and the Erie and Huron Railroad, and by steamboats from lakes Erie and Huron (Map: Ontario, A 5). It is in a rich agricultural district, has a large trade in grain and lumber, and manufactures machinery, carriages, wagons, iron goods, woolens, soap, and tobacco. The United States is represented by a consul. Population, in 1891, 9052; in 1901, 9068.

CHATHAM. A borough in Morris County, N. J., 23 miles from New York City and 15 miles west of Newark, on the Passaic River and on the Lackawanna Railroad (Map: New Jersey, D 2). With a picturesque situation and good roads, it has become a residential suburb of New York and Newark. It is the centre of an extensive rose-growing industry. Chatham owns and operates its water-works and electric-light plant. It was incorporated as a village in 1892 and as a borough in 1897. A town meeting is held annually for the election of officers. Population, in 1890, 780; in 1900, 1361.

CHATHAM, Earl of. See Pitt, William.

CHATHAM ENGINEER SCHOOL. See Military Education.

CHATHAM ISLANDS. A small group in the Pacific Ocean, 380 miles east of South Island, New Zealand, in latitudes 43° 38′ to 44° 40′ S., longitudes 177° to 179° W. (Map: Australasia, L 7). In position they are almost exactly the antipodes to Toulouse, France. Area, 375 square miles. They were discovered in 1791 by Lieutenant Broughton, and the name of his ship was given to both the cluster and its chief member. A salt or brackish lake, 20 miles long, occupies the interior of Chatham Island. The soil and climate of the archipelago, in general, are good. Wheat yields abundantly, and horses, cattle, sheep, and pigs thrive well. The seal-fisheries are an important industry, and considerable trade is carried on in supplies for whalers and passing ships. Timber is almost unknown; the native canoe, instead of being cut out of a single tree, is merely wickerwork bound together by cordage of native flax. The aboriginal Morioris, who in 1831 numbered 1200, have been supplanted by a mixed population of Maoris and whites, a few only surviving. The population, in 1901, was 419. The Chatham Islands are politically attached to New Zealand.

CHATI, shä'tē'. See Wildcat.

CHÂTILLON-SUR-SEINE, shä'tē'yôN' sur-sân' (Fr., castle: cf. Sp. *castillo*, castle). The capital of an arrondissement in the Department of Côte-d'Or, France, on the Seine, about 45 miles north-northwest of Dijon (Map: France L 4). The town is divided into two parts by the river. The Hôtel de Ville, occupying a mediæval Benedictine convent, and the Château Marmont, built by Marshal Marmont, who was born in Châtillon, are among the chief buildings of interest. There are important manufactures of woolens, cottons, hats, and leather, and iron-works. Population, in 1901, of town, 4448; of commune, 4807. Châtillon was an important fortified town in the Twelfth Century, and the seat of the dukes of Burgundy. It was the capital of the Pays de la Montagne, part of Burgundy. From February 5 to March 19, 1814, a congress of the allied powers assembled at Châtillon vainly endeavored to come to terms with Napoleon. The failure of negotiations was followed by the resumption of hostilities. Here a German detachment suffered a severe repulse, on November 19, 1870, at the hands of Ricciotti Garibaldi, and were driven back upon Château-Villain.

CHATILLON. The ambassador, or herald, from France to King John, in Shakespeare's play of the latter name. He requires the English King to relinquish the sovereignty of England, Ireland, and the English possessions in France.

CHAT'MOSS. A bog in Lancashire, England, about 12 miles square, and celebrated as the scene of successful efforts for the reclaiming of bogs in the end of the Eighteenth and beginning of the Nineteenth Century, and of one of the great engineering triumphs of George Stephenson in the construction of the Liverpool and Manchester Railway.

CHATOYANT, shȧ-toi'ant, *Fr. pron.* shä'twä'yäN' (Fr., from *chat*, cat). A mineral is chatoyant when it exhibits a changeable internal light. The phenomenon is said to be due to minute internal striations of the composite crystals of which the mineral consists. It is especially noticeable when the mineral is cut with a convex face (*en cabochon*). See Cat's-Eye.

CHATRIAN, shä'trē-äN', Alexandre. See Erckmann-Chatrian.

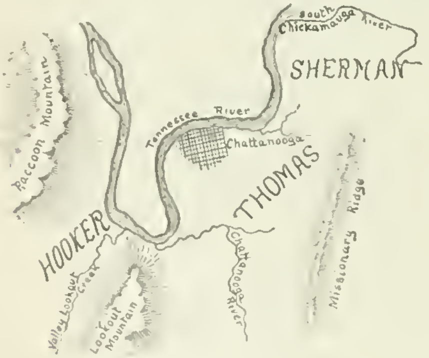
CHATROUSSE, shä'tro͞os', Emile François (1829—). A French sculptor. He was born in Paris, and studied there under Rude. His most notable works are: "La renaissance française" (1863), in the Palace of Fontainebleau; "Les crimes de la guerre" (1876); "La lecture" (1886), in the Luxembourg; and "Jeanne d'Arc" (1887).

CHATS'WORTH. The mansion of the Duke of Devonshire, and one of the most splendid private seats in England. It is situated in Derbyshire, on the Derwent. Sir William Cavendish, in 1570, began the old mansion, which was finished by his widow, afterwards Countess of Shrewsbury. In this building Mary, Queen of Scots, was imprisoned for thirteen years. The present edifice includes the Ionic pile, 183 by 172 feet, built 1687-1706, by the first Duke of Devonshire, after designs by Talman and Wren. The façade is 720 feet long, or, with the terraces, 1200 feet. The grounds around are nine miles in circuit, and are surpassed only by those at Versailles.

CHAT'TAHOO'CHEE. A river rising on the southern slope of the Blue Ridge, in northern Georgia. It traverses the State in a southwesterly direction to its western edge, where, turning south, it becomes the boundary between Georgia and Alabama, and finally, after receiving the Flint from the east, crosses Florida under the name of Appalachicola. It empties into the Gulf of Mexico (Map: Alabama, D 4). The Chattahoochee is over 500 miles long, is navigable to Columbus, 200 miles, and drains an area of about 17,000 square miles.

CHAT'TANOO'GA. A city and county-seat of Hamilton County, Tenn., 150 miles southeast of Nashville, on the Tennessee River (Map: Tennessee, F 5). The river is navigable eight months of the year as far as this place, and several lines of railroad pass through the city, making it an important railroad centre. It is finely situated amid picturesque scenery. To the south is Lookout Mountain, from which a magnificent view reaches seven States. Chattanooga has a handsome marble custom-house, the Baroness Erlanger Hospital, a public library, a fine opera-house, Grant University (Methodist Episcopal), the Chattanooga Female Institute, and the Chattanooga Medical College. The Chickamauga National Military Park, laid out by the Federal Government on the site of the battle of Chickamauga, is south by east of the city, and was dedicated in 1895. Another feature of interest is the National Cemetery, one of the largest in the country, containing 13,322 graves. A considerable trade is carried on in grain, iron, coal, and lumber, and there are extensive manufactures of iron and steel, machinery, lumber in various products, cotton goods, furniture, bricks and tiles, and many other articles. The government of Chattanooga is administered by a mayor, elected every two years, and a city council, composed of two boards. The executive and legislative branches are entirely distinct, all funds being provided by one body and disbursed by the other. The annual income and expenditures of the city balance at nearly $300,000. The main items of expense are: $30,000 for the police department, including police courts, jails, reformatories, etc.; $35,000 for the fire department; and $45,000 for schools. Originally called Ross's Landing, Chattanooga was settled in 1836, and was incorporated in 1851. It became of great military importance in the Civil War, and the vicinity was the scene of several hotly contested battles. In 1863 it was occupied by the Union forces. The city was almost destroyed during the war. Population, in 1870, 6093; in 1880, 12,892; in 1890, 29,100; in 1900, 30,154.

CHATTANOOGA, Battle of. One of the most important battles of the Civil War, fought in the vicinity of Chattanooga, Tenn., November 23-25, 1863, between a Federal army of 60,000, under General Grant, and a Confederate army of about 40,000, under General Bragg. After the battle of Chickamauga (q.v.), Bragg had held the Federal troops closely besieged in Chattanooga, and, by seizing nearly all of their lines of supply, threatened them with starvation. In October Thomas superseded Rosecrans, who had commanded at Chickamauga, and on the 23d Grant, recently placed in command of the military operations in the West, arrived in person. Grant immediately reopened his communications with the Federal base of supplies at Nashville (October 26, 27, and 28), by advancing Hooker's troops from Bridgeport and sending a small force from Chattanooga to seize the points in Lookout Valley which controlled Brown's Ferry. After awaiting reinforcements under Sherman, he took the aggressive on November 23, when Thomas, in an engagement lasting two hours, drove back Bragg's advanced guards and established a new Federal line a mile in advance of the old one. On the 24th Sherman, on the left, carried a detached point of Missionary Ridge, and Hooker, on the right, in the famous 'Battle above the Clouds,' carried Lookout Mountain, the Confederates retreating from his front during the night. At daylight on the 25th Sherman renewed his attack on the Confederate right, but, owing to the unavoidable delay of Hooker in coming to his assistance, was placed in a precarious position, and as a diversion Grant ordered an assault by Thomas's troops, under Sheridan and Wood, against the Confederate centre. These troops quickly drove the enemy from his rifle trenches, and then, without orders from Grant or Thomas, rushed impetuously up the steep hill (Missionary Ridge), and, in one of the most remarkable charges known in military history, carried the fortifications under a terrific fire, gained possession of the crest of the ridge, and drove the Confederates, panic-stricken, from the field. The Confederate retreat now became general, and during the night Bragg, hotly pursued by Sheridan, withdrew rapidly up the Chickamauga Valley. The losses in killed, wounded, and missing were for the Federals 5815; for the Confederates, 6687. The victory not only relieved Chattanooga, but also forced Longstreet, then besieging Burnside at Knoxville, to retreat into Virginia. Consult: the *Official Records*, Vol. XXXI. (Washington, 1890); Cist, *The Army of the Cumberland* (New York, 1897); Nicolay and Hay, *Abraham Lincoln: A History*, Vol. VIII. (10 vols., New York, 1897); and Grant, *Personal Memoirs* (2 vols., new edition, New York, 1895).



BATTLEFIELD OF CHATTANOOGA.

CHAT'TEL (OF. *chatel*, *catel*, Med. Lat. *captale*, *capitale*, property, from Lat. *caput*, head). A term nearly, though not quite, coextensive with the term personal property (q.v.)—that is, property which passes to the executor or administrator, as distinguished from real property, which is inheritable and passes to the heir. By chattel is meant that species of personal property which is capable of physical delivery and possession. Thus, choses in possession are chattels, but choses in action (q.v.), although personal property, are not chattels in the technical sense.

Chattels are classified as *chattels real* and *chattels personal*. A *chattel real* is any interest or property in land less than a freehold. As opposed to freeholds, chattels real are regarded as personal property; but, as being interests in real property, they are called *chattels real*, to distinguish them from other chattels, which are called *chattels personal*.

Certain objects which are a part of the real estate may become chattels upon being severed from the real estate—as, for example, timber which has been cut, or ore which has been mined and removed from the land; and certain other objects which are still attached to and form a part of real property—as, for example, growing annual crops or emblements (q.v.)—are for some purposes regarded as chattels. On the other hand, in general, chattels which become attached to the land or are used as a part of the real estate lose their character as chattels, and become real estate. Thus, the materials used in constructing a house or other structure forming a part of the real estate are real estate. Certain chattels, however, affixed to the real estate, but capable of removal—as, for example, machinery, articles of furniture, etc.—retain their character as chattels for some purposes, while for others they are deemed to be real estate. Chattels of the Church are known as fixtures (q.v.).

At common law title to chattels personal in existence could be transferred by mere agreement (see Sales), except in case of gift, when delivery of the chattel was required in order to confer a title upon the grantee. (See, also, FRAUDS, STATUTE OF, as affecting the sale of chattels.) The various branches of the law of chattels are specifically treated under the various titles relating to them, such as SALES; CAVEAT EMPTOR; TITLE; REPLEVIN; CONVERSION, etc., and the authorities mentioned under those titles, as well as under PERSONAL PROPERTY, may be consulted for a fuller statement of the law. For the early law as to ownership of chattels in England, consult Pollock and Maitland, *History of English Law* (Boston, 1899).

CHATTEL MORTGAGE. The transfer of personal property as security for a debt or obligation in such manner as to pass title to the transferee or mortgagee which may be revested in the transferrer or mortgagor upon payment of the debt or performance of the obligation; but upon his failure to pay or perform, the title becomes absolute in the mortgagee. Courts of equity, however, will allow the mortgagor to redeem the mortgaged chattel after the debt or obligation becomes due. (See MORTGAGE; PLEDGE.) The mortgagor of chattels is generally held to have title even in jurisdictions where the mortgagee of real estate is deemed to acquire only an equitable lien, as distinguished from a legal title. At common law a chattel mortgage might be made without writing or other formality, provided the chattel was delivered to the mortgagee; but under modern statutes, particularly those relating to registration (q.v.) of mortgages, a chattel mortgage is required to be in writing and recorded in order to give it validity against third parties, and in some jurisdictions, by statute, chattel mortgages become void unless refiled or otherwise renewed, as by statute required, from year to year. Consult Cobbey, *A Practical Treatise on the Law of Chattel Mortgage* (Saint Paul, 1893).

CHATTERER. A term formerly applied to the waxwings and some related birds with little applicability. It is now, with more or less propriety, restricted by ornithologists to the South American passerine family Cotingidæ, which may be better called cotingas. See COTINGA and WAXWING.

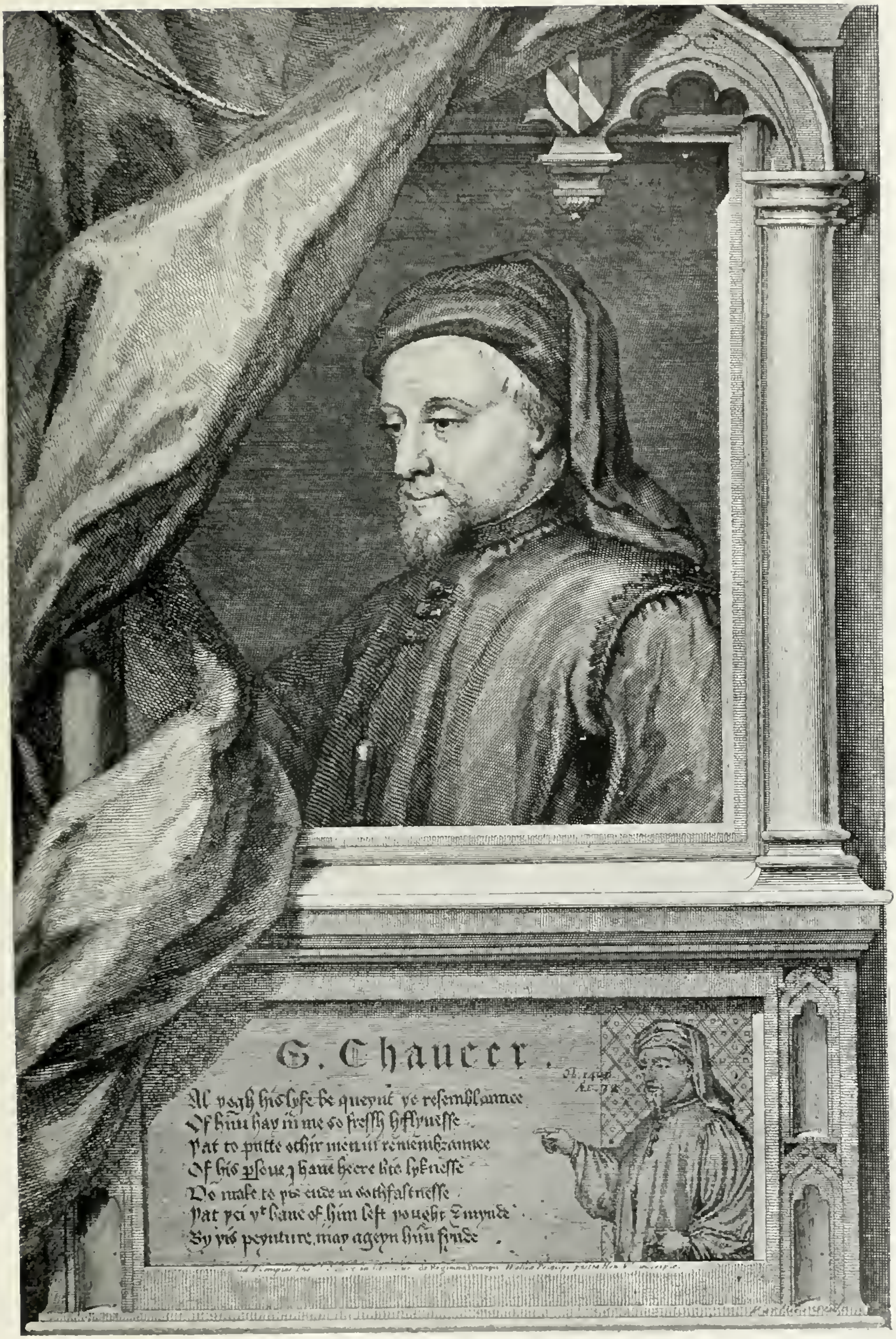
CHAT'TERTON, THOMAS (1752-1770). An English poet, born in Bristol, November 20, 1752. His father, who had once been a sexton of Saint Mary Redcliffe, Bristol, and also master of a charity school, died about two months before the poet's birth. Chatterton was educated at the school of which his father had been master, and was thought a dull child; but, making acquaintance with a black-letter Bible which his mother often used, the dormant spirit flashed up. From this book he learned to read. From early years he was fond of all kinds of antiquities; he clung around old walls like the ivy, and haunted twilight ruins like the bat. At the age of fourteen he was apprenticed to John Lambert, an attorney. His situation here was uncomfortable; he took his meals in the kitchen with the footboy, and, when refractory, was chastised with a ruler. In October, 1768, the new bridge at Bristol was opened, and Chatterton sent to a newspaper an account, in antique phraseology and spelling, of the ceremonies attending the opening of the old one in 1248, the whole purporting to be taken from an ancient manuscript. In the preceding year he presented himself to a certain Bristol pewterer, Burgum by name, and astonished the craftsman by the sight of a parchment in which his pedigree was traced back to the Norman Conquest. He also exhibited to his friends copies of old poems, which, he said, were composed by one Thomas Rowley, a mythical monk of the Fifteenth Century. These manuscripts made some stir in his native city, but not enough to satisfy Chatterton. Accordingly, Horace Walpole, at that time collecting additional materials for his *Anecdotes of Painting in England*, received from Chatterton several pages of antique writing, accompanied by a short note (1769). The pretended manuscript gave biographical sketches of celebrated painters who had flourished in England several centuries before, and of whose existence Walpole had never dreamed. Walpole, put off his guard, answered his unknown correspondent at once; expressed his delight at receiving the manuscript; and desired, as a personal favor, that all the other antique writings, poems included, mentioned in the note should be forwarded. Chatterton immediately sent accounts of a great many more painters and poets, and also gave some slight sketch of his personal history. On receipt of this second communication, Walpole suspected a trick. The poems he showed to Mason and Gray, who at once pronounced them forgeries. He then wrote Chatterton, administering a great deal of excellent advice. Chatterton replied, desiring that the manuscript should be returned at once; but by the time the letter reached London Walpole was about to start for Paris, and it was allowed to remain unanswered. It was returned three months later. From his earliest youth Chatterton had a ghastly familiarity with the idea of suicide. Among his papers preserved in the British Museum is a last will and testament, "executed in the presence of Omniscience, the 14th of April, 1770," full of the wildest wit and profanity. This and similar documents falling into the hands of his friends, led to his dismissal from Lambert's office. Released from the slavery of law, Chatterton left for London, April 24, 1770, taking with him the Rowley manuscripts. He found shelter in the house of one Walmsley, a plasterer, in Shoreditch. No sooner had he settled there than he began to work as with a hundred hands. During the last few months of his life he poured forth squibs, satiric poems, political essays, burlettas, letters in the style of Junius, and meditated writing a history of England, to appear in parts. For a time his prospects seemed very bright. He obtained an introduction to Lord Mayor Beckford; he sent glowing letters home, accompanied by presents to his mother and sisters. Ultimately he left the plasterer's in Shoreditch, and took lodgings in Brooke Street, adjoining Holborn. Unhappily for him, editors of opposition papers were willing enough to insert and praise his articles, but were disinclined to render an equivalent in cash. The means of life were now fast failing. On August 25, 1770, his landlady, alarmed that her lodger did not make his appearance, had the door of his room broken open; saw the floor littered with small pieces of paper, and Chatterton "lying on the bed with his legs hanging over, quite dead." He had taken arsenic, in anticipation of a slower death from starvation.

Chatterton, dying before he was eighteen years old, was certainly a marvelous boy. While a peculiar interest is attached to all that he wrote, he is best remembered as the author of the so-called 'Rowley Poems.' Of them only one—"Elinour and Juga"—appeared during his life. The rest were collected and published by T. Tyrwhitt, in 1777. Some of them possess that rare beauty of imagination which we associate with Coleridge and Keats. Indeed, these latter poets owed much to Chatterton. So, too, did Rossetti and William Morris. We may cite especially: "The Ballade of Charity;" the first and third "Eclogues;" the "Tragedy of Ælla;" the "Tragedy of Godwin;" "The Tournament;" and the "Parliament of Sprites." Consult: Masson, *Chatterton: A Biography* (New York, 1899); *The Poetical Works of Chatterton*, edited by Skeat (London, 1875); Watts-Dunton's essay in Ward, *English Poets*, III. (London and New York, 1880); and Beers, *English Romanticism* (New York, 1898).

CHAUCER, cha̤'sẽr, Geoffrey (c.1340-1400). The first great English poet. The son of John Chaucer, a London vintner, he was born in London about 1340, or possibly a few years earlier. Of the poet's life few trustworthy details have come down to us; the usual biography is a fabrication. But certain facts are contained in the official documents of the time, and, besides this, Chaucer sometimes speaks of himself. In 1357 he was in the service of the Countess of Ulster, wife of Lionel, the son of Edward III. His position was most likely that of a page. He was in the army of his King, who invaded France in 1359-60. He was taken prisoner, but was ransomed on March 1 of the latter year. Chaucer is not mentioned again until 1367, when he received from the King a pension of 20 marks under the title of 'valet.' From this time on Chaucer may be followed more closely, his name occurring frequently in public documents. From valet he rose to the rank of squire in the King's household. Chaucer was soon sent on several important foreign missions to Flanders, France, and Italy. His first Italian journey was in 1372-73, when he went to Genoa and Florence, and, as many believe, to Padua, where he learned from Petrarch the story of the Patient Griselda, the tale told by the Clerk of Oxford, one of the Canterbury pilgrims. In 1378 he again went to Italy, returning early the next year. In 1374 he was appointed comptroller of the customs for wool, skins, etc., at the port of London, and in 1382 comptroller of petty customs—of wine, candles, and other small articles. Both these positions he lost in 1386, but in that year he was elected to Parliament from Kent. Three years later he was appointed clerk of the King's works at Westminster the Tower of London, and various royal manors, and in 1390 clerk of the works for Saint George's Chapel, Windsor. During 1391 he lost these positions, probably because the repairs were completed. At about this time he became forester of North Petherton Park, Somersetshire. This appointment he held until his death. After 1386 Chaucer was at various times in financial trouble. It is not to be supposed that he was inefficient as an executive officer; he was rather a sufferer from the ups and downs of politics. During the reign of Richard II. (1377-99) there were two parties, one led by John of Gaunt and the other by the Duke of Gloucester. Chaucer belonged to the first and shared in its reverses. When Henry Bolingbroke gained the throne as Henry IV. (1399), Chaucer was placed in better circumstances, but he did not live to enjoy his good fortune. He died on October 25, 1400, and was buried in Westminster Abbey. Chaucer was married some time before 1374, probably as early as 1366. The surname of his wife is uncertain, but her Christian name was Philippa. She seems to have died in 1387. The fifth centenary of Chaucer's death was observed on October 25, 1900, when the Poet Laureate unveiled a memorial window to him in Saint Saviour's Church, Southwark.

Chaucer was thus a man of affairs as well as a poet. The exact date of composition cannot be fixed for his various poems. In grouping them, it has been customary to assign those that show a knowledge of Italian literature to a period following the first visit to Italy. But this procedure is not quite convincing. In the prologue to the "Legende of Good Women," written about 1385, Chaucer mentions his most important poems down to that date—"Troylus and Cryseyde," "The House of Fame," "Boke of the Duchesse," the "Assembly of Foules," "Palamon and Arcite," "Life of Saint Cecile" (the last two were incorporated into the *Canterbury Tales*) and many ballades, roundels, and virelays. All these poems just mentioned by name are very beautiful. Of them, "Troylus and Cryseyde," founded on the mediæval Troy legend, is by far the longest. It was a favorite with Dante Rossetti; and Chaucer is indeed most subtle here in his psychology. In much of the work cited above, Chaucer was to some extent a translator. He did not, however, follow Boccaccio and his other originals slavishly, but rather made use of them in a broad and free way. His greatest work is the *Canterbury Tales*. Here Chaucer brings together at the Tabard Inn men and women of every degree, from the knight to the cook, and plans to have each tell stories on the way to Canterbury and on the return. Of this vast scheme he lived to carry out only a part. The stories were intended to represent the types current in his day, such as the romance of chivalry, the legend, and the *fabliau*, or fable, and they were to be in harmony with the characters sketched so delightfully in the prologue. Of this prologue, Dryden wrote the famous passage: "'Tis sufficient to say, according to the proverb, that here is God's plenty. We have our forefathers and great-grandames all before us, as they were in Chaucer's day; their general characters are still remaining in mankind, and even in England, though they are called by other names than those of monks, and friars, and canons, and lady abbesses, and nuns; for mankind is ever the same, and nothing lost out of nature, though everything is altered."

Chaucer wrote several minor poems, among which are the "Complaint to Pity" and the "Complaint to His Purse." While it is agreed that Chaucer translated "The Romance of the Rose," there is disagreement as to whether the extant version is wholly his. Indeed, it has been argued, though not very successfully, that it is throughout the work of another hand. "The Court of Love," "The Flower and the Leaf," and certain other poems that have been attributed to him critics no longer accept as his. Chaucer


G. Chaucer.
Ob. 1400
Æt. 72
Al þogh his lyfe be queynt ye resemblaunce
Of him hay in me so fressh lyflynesse
Þat to putte othir men in remembraunce
Of his persone I haue heere his lyknesse
Do make to þis ende in sothfastnesse
Þat þei yt haue of him lest þought & mynde
By þis peynture may ageyn him fynde

GEOFFREY CHAUCER

FROM AN ENGRAVING BY GEORGE VERTUE
AFTER THE MINIATURE IN A MANUSCRIPT OF THE WORKS OF THOMAS OCCLEVE

also translated the work of Boëthius entitled *De Consolatione Philosophiæ*, a favorite book of the Middle Ages, and one of which we have a version by King Alfred. No better than his contemporaries in prose, Chaucer rises far above them all in verse. At a time when English poetry was dull and without art, he wrought as a craftsman of the very first rank. He invented the seven-line stanza and the heroic couplet employed by Dryden, Pope, and a host of other poets. He was indeed the father of English poetry.

The first competent editor of Chaucer was Thomas Tyrwhitt, whose edition of the *Canterbury Tales* appeared in 1775, a glossary being added three years later. An admirable edition of the *Complete Works*, by Walter W. Skeat, in seven volumes, was published at Oxford in 1894-97. A convenient edition in one volume is the Globe (London and New York, 1898). The most exhaustive work on Chaucer is by T. R. Lounsbury: *Studies in Chaucer* (3 vols., New York, 1892). Indispensable to the Chaucer student are the publications of the Chaucer Society, founded in 1867 by F. J. Furnivall. Consult also: Ten Brink, *Chaucer: Studien zur Geschichte seiner Schriften* (Münster, 1870); *Chaucer: Sprache und Verskunst* (Leipzig, 1884); and Skeat, *The Chaucer Canon* (Oxford, 1900).

CHAUCER OF FRANCE, THE. A name given to Clément Marot (q.v.), a French poet (1497-1544).

CHAUCER'S DREAM. A title originally prefixed to that poem of Chaucer which is now known as *The Bok of the Duchesse*, or *The Deth of Blanche*. In all editions of Chaucer subsequent to that of Speght in 1597, however, it is given to a poem which had been hitherto unrecognized. Although little is known as to the origin or history of the latter piece, there is no reason to doubt the authenticity of the authorship. The earliest manuscript of it which has come down belongs to the year 1550.

CHAUCER SOCIETY, THE. A society founded in 1867 in London, by F. J. Furnivall, for the purpose of facilitating Chaucerian research and opening a knowledge of the great poet's works to the public.

CHAUCI, kạ'sī. An ancient German tribe which dwelt along the North Sea, between the Amisia (Ems) and the Albis (Elbe). The Romans often came into conflict with them, notably during the reign of Claudius (41-54). Tacitus (Germ. 35) records that they were conspicuous for their love of peace and justice, powerful but not ambitious, ready to resist aggression, but never provoking war. After the Fifth Century they disappear from history.

CHAUDESAIGUES, shō'dzäg' (Fr. translation of Lat. *Calentes Aquæ*, hot springs). A watering-place of France, in the Department of Cantal, about 12 miles south-southwest of Saint-Flour (Map: France, K 7). It has five hot springs with a maximum temperature of 177°, the waters of which are considered as very efficacious in cases of rheumatism, and are also used for washing clothes and the heating of houses. There are also three cold springs. Population, in 1901, of town, 1066; of commune, 1645.

CHAUDET, shō'dā', ANTOINE DENIS (1763-1810). A French sculptor and painter, born in Paris. His statue of Œdipus, finished in 1801, established for him a high reputation. Among his other works are "Paul and Virginia," "Sensibility," a silver statue of "Peace," and the "Napoleon" that crowned the Vendôme Column. His activity as a painter was secondary. His wife, Jeanne Elizabeth Gabion (1767-1832), was his pupil in painting.

CHAUDIÈRE (shō'dyâr') **LAKE** (Fr., caldron). An expansion of Ottawa River in Canada, just above the City of Ottawa, at which place the Chaudière Falls occur (Map: Ontario, G 2).

CHAUDIÈRE RIVER. A river of Canada which rises near the northwest border of Maine, in small headstreams which flow into Lake Megantic, from which the Chaudière River issues. It flows generally north-northwest to join the Saint Lawrence, about seven miles above Quebec. It is about 120 miles long (Map: Quebec, E 4). The falls of the same name are 2½ miles above its mouth.

CHAUFFEUR, shō'fẽr' (Fr., burner), or GARROTTEUR. A member of the bands of outlaws during the Reign of Terror in France who roamed over the northeastern part of the country, under the lead of John the Skinner, or Schinderhannes. They garroted men and women, and roasted their feet to compel them to disclose hidden treasure. In 1803 vigorous measures were taken which resulted in their suppression. (See BRIGANDAGE.) With the increasing use of the automobile as a means of recreation and transportation, the term chauffeur was applied to the driver who operated the carriage and the mechanic who was carried to look after the machinery and fuel. The origin of this use of the term is found in France, where automobiling first won favor as a sport, the word chauffeur being there employed to designate a fireman or stoker. See AUTOMOBILE.

CHAULIAC, shō'lyȧk', GUY DE (c.1300-c.80). A French surgeon. He first practiced in Lyons, and was physician to three of the Popes of Avignon. In his profession he was far in advance of the time, and his *Chirurgia Magna* (1363) was for three centuries the indispensable manual of surgeons.

CHAUMETTE, shō'mĕt', PIERRE GASPARD (1763-94). A notorious character of the French Revolution, born at Nevers. Through Camille Desmoulins, he was made a member of the Club of Cordeliers; and he soon became connected with one of the revolutionary journals. After the events of August 10, he became procureur-syndic of Paris. He was guillotined April 13, 1794, at the instance of Robespierre. Chaumette was one of the most extravagant revolutionists in an age that had gone mad on revolution. At one time, according to tradition, he proposed that the French people should be made to wear wooden shoes and to subsist on potatoes.

CHAUMIÈRE INDIENNE, shō'myâr' ăN'dē-ĕn', LA. See SAINT PIERRE, JACQUES HENRI BERNARDIN DE.

CHAUMONOT, shō'mō'nō', PIERRE MARIE JOSEPH (1611-93). A French Jesuit missionary in North America. He was the son of a vine-dresser, but was brought up by his uncle, a priest, who lived at Châtillon, on the Seine. At the age of ten he ran off, with a companion, to study music at Beaune, Burgundy, under the Fathers of the Oratory; but, having stolen 100 sols (about a dollar) from his uncle, and dreading to be disgraced therefor at his home, he made a pilgrimage to Rome, where he fell under the influence of the Jesuits, and in 1639 went to Canada as a missionary to the Indians. Soon after arriving at Quebec, he left for work among the Hurons, and for a year was stationed at Ossossane. For some time he busied himself gathering information for a dictionary of the Huron language and dialects, and in 1540 accompanied Brébeuf (q.v.) on a mission to the Neutral Nation, a tribe which then lived west of the Iroquois, between Lake Ontario and Lake Erie. This mission proving unsuccessful, he went to Saint Michael, where he remained until 1648, when the Iroquois destroyed this settlement, together with nearly all the others in this vicinity, and almost exterminated the Hurons. Chaumonot accompanied the survivors first to Saint Joseph's Island, in Lake Huron, and afterwards to the island of Orleans, where he was able to complete the work on his dictionary and prepare a grammar besides. From 1655 to 1658 he worked among the Iroquois at Onondaga, and then spent some time in Montreal, where, in 1663, he founded the Society of the Holy Family. He finally returned to the Hurons, among whom he remained until his death. His life was full of hardship, persecution, and suffering, and, like that of the other Jesuit missionaries of the time, was remarkable for its self-abnegation and unobtrusive heroism. Chaumonot left a curious autobiography, *Vie de P. M. J. Chaumonot, écrite par lui-même* (1688), the original of which is in the Hôtel-Dieu, Quebec. It was published by Shea, in New York, in 1858. A continuation (to 1693), *Suite de la vie de P. M. J. Chaumonot par un père de la compagnie* (probably Rale), was also published in New York in the same year.

CHAUMONT, shō'mōN' (Fr., bald hill). The capital of the Department of Haute-Marne, France, situated on an elevation between the rivers Marne and Suize, about 140 miles southeast of Paris (Map: France, M 3). The railway viaduct across the Suize is a remarkable structure, 1960 feet long with 50 arches. The city is well built, with clean, spacious streets, and fine promenades around the upper part of the town. The Church of Saint Jean exhibits fine examples of Flamboyant Gothic, of Renaissance, and transitional architecture of the Thirteenth, Fifteenth, and Sixteenth centuries, and contains some good paintings and sculptures. Among the town's monuments is a bronze statue of Philippe Le Bon, a native and the pioneer of gas-lighting in France. There are considerable manufactures, including wax candles, hosiery, cotton, yarn, kid gloves, etc. There is also a brisk trade in grain, ironware, and coal. The town traces its origin to a baronial castle erected in 940. At Chaumont on March 1, 1814, the allied powers formulated a plan for the reconstruction of western Europe, and bound themselves by treaty not to lay down arms till France had been reduced to its ancient boundaries. Population, 1901, of town, 11,697; of commune, 14,622.

CHAUNA, chou'nȧ. A bird. See SCREAMER.

CHAUNCEY, chän'sĭ *or* chạn'sĭ, ISAAC (1772-1840). An American naval officer. He was born in Black Rock, Conn., and at an early age began a seafaring life in the mercantile service, in which he was conspicuous for enterprise and energy. In 1799 he entered the newly organized navy as a lieutenant, and in 1802 he was made acting captain, commanding the *Chesapeake*, the flagship of the squadron sent against Tripoli. Throughout the War of 1812 he had command on the Great Lakes. In 1813 he participated in the capture of York (now Toronto) and of Fort George, thus helping to drive the enemy from the whole of the Niagara region, and on October 5 he captured five British vessels and a regiment of troops. At the close of the war he was placed in command of the Brooklyn Navy Yard, and in 1815 commanded the Mediterranean squadron, and, with William Shaler, consul, negotiated the treaty of peace with Algiers.

CHAUNCY, or **CHAUNCEY**, CHARLES (1592-1672). An American clergyman and educator, the second president of Harvard College. He was born at Yardley, England: graduated, in 1613, at Trinity College, Cambridge, of which he was for some time a fellow, and for several years was professor of Greek there. He was vicar of Ware from 1627 to 1633, and of Marston Saint Lawrence, Northamptonshire, from 1633 to 1637, and in both pastorates came into frequent conflict with the ecclesiastical authorities. He was first called to account for his opposition to the *Book of Sports*, and for his presumption in substituting catechetical exercises for the prohibited afternoon sermon, and in 1629 he was brought before the Court of High Commission for having said that "idolatry was admitted into the Church," and that "there is much atheism, popery, Arminianism, and heresy crept into the Church." In 1635 he was again brought before the court, this time for objecting to a rail around the communion table, and to the act of kneeling at the communion service, and after trial publicly recanted. In 1638 he emigrated to America, and for three years preached in Plymouth; but in 1641 he became the pastor at Scituate, where, says Mather, "he remained for three and three times three years, cultivating the vineyard of the Lord." In 1654 he planned to return to his old pastorate at Ware; but the overseers of Harvard had meantime chosen him to succeed President Dunster, and "by their vehement importunity" induced him to remain. From this time until his death he was president of the college. Besides a number of sermons, he published: *The Doctrine of the Sacrament, with the Right Use Thereof* (1642); *The Plain Doctrine of the Justification of a Sinner in the Sight of God* (1659), a collection of twenty-six sermons; and *Antisynodalia Scripta Americana* (1662). Consult: The interesting sketch in Cotton Mather, *Magnalia* (London, 1702), and Fowler, *Memorials of the Chaunceys* (Boston, 1858).

CHAUNTER, chänt'ẽr (OF. *chantur*, It. *cantatore*, Lat. *cantator*, singer, from *cantare*, frequentative of *canere*, to sing). The highest pipe of the bagpipe (q.v.), on which the chaunt or melody is played.

CHAUS, kā'ŭs (Neo-Lat., from the native name). The Indian jungle-cat (q.v.).

CHAUSSARD, shō′sär′. Pierre Jean Baptiste (1766-1823). A French author. He was born in Paris, and was educated at the Collège Saint Jean de Beauvais. In 1792 he was sent as commissioner to Belgium to effect a union between that country and France, and upon his return he was appointed Secretary-General of Public Instruction. His *Mémoires historiques et politiques sur la révolution de Belgique et du pays de Liége* (1793) is an important contribution to the history of that period.

CHAUSSES, shōs (Fr., stockings). In the Middle Ages, defensive armor for the legs. Some were made of padded and quilted cloth, with metal studs; some of chain mail; some of riveted plates; and some of banded mail. It was not unusual to fasten them by lacing behind the leg.

CHAUTAUQUA, shȧ-tạ′kwȧ. A town in Chautauqua County, N. Y., popular as a summer resort, and noted for its educational facilities and its picturesque situation 1290 feet above sea-level, on the western shore of Chautauqua Lake (Map: New York, A 3). Steamboats ply on the lake, which is reached by several railroads. The town has a hotel and numerous cottages, and among features connected with the educational work of the Chautauqua Assembly are an amphitheatre with a seating capacity of 5000, the 'Hall in the Grove,' a museum, gymnasium and athletic field, administration building, and buildings for lectures, recitations, etc. The New York State Summer Institute also is located here. The population was, in 1890, 3259; in 1900, 3500.

CHAUTAUQUA. The name of a lake and a county in southwestern New York, which has, during the past quarter of a century, become associated with a system of popular education now generally known, but by many only vaguely understood. The fundamental principle of this system is that the higher education may and should be extended to all alike, and that education, best begun in academy, college, and university, is not confined to youth, but continues through the whole of life. Broadly speaking, the influence of Chautauqua is two-fold—it is exerted, through the summer assembly, directly upon those in attendance; and, by means of reading circles and correspondence instruction, upon self-educating readers and students in their own homes. These two plans may be successfully combined, for, by supplementing home study during the year with six weeks' residence at Chautauqua in the summer, a conscientious and persevering student may do work of a high grade. The function of Chautauqua in the educational system of the United States is, therefore, compensatory and supplementary. While its methods cannot be by any means an adequate substitute for college training, they may stimulate personal development among ambitious persons denied college opportunities, and among all classes may encourage habits of systematic reading and study.

The Summer Assembly. The first Chautauqua Assembly (known as the 'Sunday-school Assembly') was in session August 4-18, 1874, as the result of a plan formed by Lewis Miller, of Akron, Ohio, and Rev. John H. Vincent, of New York. Both men were interested in the improvement and development of Sunday-schools. To this end they devised a meeting which should be more than a mere conference of two or three days, and which should include courses of study in pedagogical principles, biblical analysis, and practical questions of Sunday-school organization and management, extending over a period of ten days or two weeks. The plan also recognized the importance of recreative exercises, and of certain lectures of a general character not strictly related to the main subject of Sunday-schools. It was decided to hold this 'assembly' in camp, to adopt the unquestionably good features of the so-called camp-meeting, but to give prominence to the calm, earnest, careful study of important principles and methods. Although the plan originated with members of the Methodist Episcopal Church, there was no thought of making the Assembly denominational. At the first session all the leading Protestant bodies were represented, and there has never since been any attempt to make distinctions. The attendance in 1874 was gratifyingly large. In spite of primitive lodgings and many discomforts, there was a spirit of enthusiasm which promised well for the success of the experiment. The Sunday-school Normal Department provided means for daily study under experienced instructors; prominent speakers gave lectures of a popular character on biblical themes. A large model of Palestine (300 feet long) was laid out near the lake (which served as the Mediterranean), and students were conducted through this miniature land by Oriental travelers.

The Assembly plans widened rapidly in successive years. The system which had succeeded in the case of Bible study was quickly extended to include science, language (the teaching of Hebrew began in 1875), and literature. Music of a better grade was introduced, and a large chorus was drilled daily. This expansion has continued, until now the staff of lecturers and instructors numbers more than two hundred men and women prominent in all departments of educational life. Every year, at least one well-known British scholar is induced to cross the Atlantic especially to lecture at Chautauqua. Gradually, progressive courses on some one topic have been substituted for miscellaneous addresses on a great variety of subjects. In 1876 the session was lengthened to three weeks, and now covers nearly two months. Thus began the Chautauqua assembly, based on the theory that change of occupation, not idleness, is true recreation, and that the summer vacation may be made a means of development and stimulus to those engaged during the year in the ordinary pursuits of life.

Summer Schools. In 1879 a school for teachers in secular subjects, called 'The Teachers' Retreat,' was opened, with a faculty of efficient instructors. This department has grown steadily in numbers and importance, and is a leading summer school of methods. It is now the School of Pedagogy. In the same year (1879) the School of Languages (now the College of Liberal Arts) began, with courses in German, French, Latin, Greek, Hebrew, and Sanskrit. The development of this school has been marked by important changes, largely due to Dr. William R. Harper, president of the University of Chicago, who became instructor in Hebrew in 1882, and principal in 1885. In 1888 the School of the English Bible (now the School of Sacred Literature) was organized, also under the principalship of Dr. Harper. This department, designed to promote the study of the Bible as a great literary masterpiece as well as an inspired volume, was received with immediate favor, and has grown rapidly. In addition to these three schools, many other subjects of study have been added, until there are now fifteen distinct departments under the principalship of Prof. George E. Vincent, son of the founder of the institution. These various schools are as follows: (1) School of English Language and Literature; (2) School of Modern Languages; (3) School of Classical Languages; (4) School of Mathematics and Sciences; (5) School of Social Sciences; (6) School of Pedagogy; (7) School of Religious Teaching; (8) School of Library Training; (9) School of Music; (10) School of Fine Arts; (11) School of Expression; (12) School of Physical Education; (13) School of Domestic Science; (14) School of Practical Arts; (15) School of Arts and Crafts. Many of these schools are under the direction, or command the services, of professors from the leading universities and colleges of the country.

In addition to the instruction given in these schools, the institution includes: (1) A variety of lecture courses on the university-extension model, in which a number of lectures are given by one professor and upon which the attendance is large; (2) public lectures and addresses by men and women prominent in various departments of life; (3) recreative and æsthetic entertainments, such as concerts, dramatic recitals, stereopticon lectures, etc. The public programs are divided into series each extending over a week and each emphasizing in the discussions some great movement of the time. No additional fee is charged for these lines of work, and they form a most popular and most successful part of the Assembly work. More than two thousand students have been in the summer school of a single year.

THE CHAUTAUQUA LITERARY AND SCIENTIFIC CIRCLE. Probably Chautauqua is best known in connection with this plan of systematic home reading. In 1878 at Chautauqua this plan was proposed and explained. The announcement went out to the press, and the first year 7000 persons were enrolled. From that time, every autumn and winter, readers varying in number from 8000 to 25,000 have joined the circle. During this period more than 260,000 persons have taken this work. About 50 per cent. of these have done continuous work for two years, and about 50,000 have completed the four years' course.

The system was founded in the belief that thousands of ambitious men and women were only waiting for definite suggestion and aid in reading. The plan consists of: (1) A four years' course of reading, including selections in English from the ancient classics, history, economics, literature, and art. Each year of the four is devoted especially to a great nation, and is known as 'The Greek Year,' 'The Roman Year,' 'The English Year,' or 'The American Year.' No attempt is made to study language or mathematics. The course is general, and follows in a measure the subjects taught in the average college; it gives what has been called the 'college outlook.' (2) Certain books, many of them specially prepared by well-known authors, are designated each year by a council of six prominent men. (3) A monthly magazine, *The Chautauquan*, containing supplementary articles on the subjects of the course by the leading writers of the day; general miscellaneous matter on current affairs; several departments designed to aid the reader, such as apportionment of the course by the week or month, notes on the books, outlines of reading, word studies, etc. (4) A membership book, sent to each reader, including analyses of the required books, and question papers (memoranda), to be filled out and returned to the office. These papers are intended to aid the reader in reviewing and systematically arranging the facts and principles he has learned. They are not examinations, nor are they regarded as such. (5) Local circles, which may be formed in any community where three or more readers desire the benefit of comradeship. More than 10,000 such circles have been formed. (6) A certificate, granted at the end of the course to all who state in writing that they have faithfully read all the required literature. Such certificate has no significance beyond the fact stated, and, of course, has no relation to a degree.

The readers enrolling each year are known as a 'class,' and assume the numeral of the year during which their course is completed, after the plan of American colleges. This device, with the thought that so many people in this country and in foreign lands are reading the same books at the same time, creates a certain spirit of fraternity and enthusiasm that contributes to the success of the plan. For those who have completed the four years' course, or for others, there are many special courses in history, literature, science, and art, which enable a reader who has found a congenial subject in the general course to pursue a specialty. There is also a plan by which these special courses may be directed by correspondence with one or another college professor. More than seventy-five such specialized courses are now offered. The importance of continued reading is always emphasized.

In 1902 a new charter was granted to Chautauqua in the nature of an amendment to the former law. It states that the purpose and object of Chautauqua Institution shall be to promote the intellectual, social, physical, moral, and religious welfare of the people. To this end it may hold meetings and provide for recreation, instruction, health, and comfort on its grounds at Chautauqua; conduct schools and classes; maintain libraries, museums, reading and study clubs, and other agencies for home education; publish books and serials, and do such other things as are needful or proper to further its general purpose.

PRESENT STATUS. Architecturally the summer city of Chautauqua has kept pace with the progress of the plan. All the schools and classes are provided with suitable buildings; there are public lecture halls of capacity varying from 200 to 5000, a well-equipped gymnasium, museum, etc. A large organ and a chime of eight bells are the permanent property of the assembly. The revenue of the assembly is collected, like the customs dues of a foreign city, at the gates. No public 'collections' are ever taken. A tax is levied upon all who enter and become members of the community. Chautauqua carries the municipal idea beyond mere material matters to include public instruction and entertainment. All exercises, except class instruction in the college, are free to any one within the town limits, and a tuition ticket giving all the educational privileges of the assembly may be had at a nominal price.

Social Assemblages. There are now scattered throughout the United States and Canada more than three hundred local assemblies modeled after the original Chautauqua. Most of these are local in their influence; but a few, such as the Champlain Assembly at Plattsburg, N. Y. (see Catholic Summer School), and the Jewish Chautauqua at Atlantic City, N. J. (see Jewish Chautauqua Society), are doing for special interests or sects a work quite similar in character to that at Chautauqua. There is no organic relation between these local assemblies and the original, but most of them adopt as a part of their regular work the home reading courses of the mother institution.

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CHAUTAUQUA LAKE. A beautiful stretch of water in Chautauqua County, in extreme western New York, 730 feet above the level of Lake Erie, and about 1300 feet above the sea (Map: New York, A 3). It is 18 miles long and about 2 miles wide, with an outlet into Conewango Creek, and thence into Allegheny River. It drains only a small area, having no large feeding streams. The lake is in a country famed for its scenery, and on its banks is the celebrated Chautauqua Summer School. Mayville is at the head of the lake and Jamestown at the foot, on the outlet.

CHAUVEAU, shō̇'vō̇', Pierre Joseph Olivier (1820-90). A Canadian statesman and writer, born and educated in Quebec. He was chosen to the Provincial Legislature in 1844, and became Solicitor-General in 1851 and Provincial Secretary in 1853. In 1855 he was appointed superintendent of education for Lower Canada. On the organization of the Confederation he became Premier of Quebec, and in 1873 was chosen Speaker of the Canadian Senate. He became professor of Roman law in Laval University in 1878, and at one time was president of the Royal Society of Canada. Besides poems, he published: *Charles Guérin, roman de mœurs canadiennes* (1852); *L'instruction publique au Canada* (1876); and *François-Xavier Garneau, sa vie et ses œuvres* (1883).

CHAUVEAU-LAGARDE, shō̇'vō̇' lä'gärd', Claude François (1756-1841). A French advocate, born at Chartres. He courageously defended Marie Antoinette, the Princess Elizabeth, General Miranda, Brissot, and Charlotte Corday before the Revolutionary tribunal. Apprehended and imprisoned, he escaped death through the fall of Robespierre. In 1828 he was appointed a counselor of the Court of Cassation. His chief work is *Note historique sur le procès de Marie-Antoinette et de Madame Elisabeth* (1816).

CHAUVENET, shō've-nā', William (1820-70). An American mathematician. He was born in Milford, Pa., graduated at Yale in 1840, was professor of mathematics in the navy from 1841 to 1859, and assisted in the establishment of the Naval Academy at Annapolis and of its observatory, of which he was made director. He was for a time professor of mathematics and astronomy and chancellor in Washington University, at Saint Louis, Mo. Among his works are an excellent *Treatise on Plane and Spherical Trigonometry* (1850), and a *Manual of Spherical and Practical Astronomy* (1863). Consult "Memoir of William Chauvenet," in the *Biographical Memoirs of the Academy* (Washington, 1877).

CHAUVINISM, shō'vĭn-ĭz'm. The name given in France to a policy of excessive national self-glorification, accompanied by an attitude of aggressive hostility to everything foreign. Chauvin was the name of an old battle-scarred veteran of the Empire who adored the memory of Napoleon and who was continually talking of his achievements at Austerlitz and Jena, and his determination to take a brilliant revenge for Waterloo. The vaudevillists of the day—Scribe, Cognard, Bayard, and Dumanoir—seized upon him as a subject for the comic stage, and since then a *Chauvinist* has come to mean a man who has extravagant and narrow-minded notions of patriotism and enmity toward foreign people, equivalent to our word Jingo.

CHAUX-DE-FONDS, shō̇'de-fôɴ', La (Fr., deep lime). A town in the Canton of Neuchâtel, Switzerland, nine miles northwest of Neuchâtel (Map: Switzerland, A 1). It is situated in a bleak valley of the Jura, at an elevation of 3070 feet above the sea, and is regularly built, with broad, straight streets, and stone houses. The most notable structures are the aqueduct, 13 miles long; the Protestant church, with a fine, vaulted roof; the hospital; the college, which contains the municipal picture gallery; the historical museum; and the library. Among the educational institutions is a watch-making and technical school. Chaux-de-Fonds is the second largest watch and clock making centre in Switzerland, and also manufactures articles in gold, silver, bronze, and enamels, lenses and scientific instruments. Population, in 1888, 25,603; 1900, 36,388.

CHAVES, shä'vĕsh (Portug., hot). A town and fortress of the second class in Portugal, in Tras-os-Montes, near the Spanish frontier, situated on a plain on the left bank of the Tamega, which is here crossed by an old Roman bridge of twelve arches (Map: Portugal, B 2). In the neighborhood are saline springs, which are much frequented, and the remains of a Roman bath-house. Its industries consist of silk and linen weaving. Population, about 7000.

CHAY ROOT (Tamil, *chaya*), Choya, or Sayan (*Oldenlandia umbellata*). A perennial herbaceous plant of the order Rubiaceæ, said to be a native of India. It is cultivated on the coast of Coromandel for the sake of its long, orange-colored roots, the bark of which affords a beautiful red dye. The quality of the bark is said to be improved by keeping it for some years. It is the coloring matter obtained from chay root which is used to paint the red figures on chintz. Chay root is the Indian madder, and with it some tribes in Ceylon formerly paid their tribute.

CHEAP'SIDE (M. Engl. *chepe*, AS. *cēap*, bargain, ultimately connected with Lat. *caupo*, innkeeper + *side*). A street in London extending from Saint Paul's Churchyard east to the Mansion House. It is famous for its fine stores, especially of jewelers and mercers, and for its historical reminiscences. It was originally an open square crossed by Watling Street (q.v.), where fairs, markets, and the like were held during the Middle Ages. It is from its mediæval use that it received its name. The square was narrowed down into a street after the 'Great Fire.'

CHEAT (abbreviation of *escheat*; OF. *eschet*, Med. Lat. *excadere*, from Lat. *ex*, out + *cadere*, to fall). As a term of English criminal law, cheat has a narrower signification than in popular usage. For example, a man may be induced to sell goods on credit to another by the false representation of the latter concerning his financial responsibility, and thus be defrauded; but such fraud by the purchaser does not amount to a common-law cheat. To constitute that offense, false weights and measures, or a false token, coin, or sign must be used, or there must be a *conspiracy* (q.v.) to cheat and defraud. It was an offense against public trade, rather than against an individual. By statute, both in England and in the United States, many fraudulent acts are indictable which did not amount to common-law cheats. See FALSE PRETENSES.

CHEAT. See BROME GRASS.

CHEAT RIVER. A river of West Virginia, formed by four forks, rising in the eastern part of the State in the Alleghany Mountains, and uniting in Tucker County (Map: West Virginia, E 2). It flows through a region rich in iron and coal, and joins the Monongahela River in Pennsylvania, 4 miles from the State line. It is about 125 miles long, but drains a rather narrow area, owing to its nearness to other streams. It furnishes abundant water-power, and in portions of its course flows through narrow gorges amid magnificent scenery.

CHEATS, THE. A comedy by John Wilson written in 1662, published in London, in quarto, in 1664, and performed by Killegrew's company at Vere Street, Clare Market, in 1663. It is a satirical farce in mockery of the Nonconformists, and excited so much disapprobation that it was soon withdrawn. See SCRUPLE.

CHEATS OF SCAPIN, skä'păN', THE. A farce by Otway, performed in February, 1677, and published in the same year, bound up with the author's *Titus and Berenice*, which had been first produced at the same performance. A second edition appeared in 1701. It is a close adaptation of Molière's *Les fourberies de Scapin*, and was played as far down as the end of the Eighteenth Century. The first edition was dedicated to Lord Rochester.

CHEBEC'. The least fly-catcher (*Empidonax minimus*), a small, olive-green garden bird, common in the eastern United States, so named from its sharply accented call-note. See PEWEE.

CHEBOYGAN, she-boi'gan. A city and county-seat of Cheboygan County, Mich., 165 miles north by west of Bay City, at the mouth of the Cheboygan River, on Lake Huron, and on the Michigan Central Railroad (Map: Michigan, J 3). It has a good harbor, connected with lake ports by regular steamship lines, and controls large lumbering interests. Settled in 1849, Cheboygan was incorporated in 1877. The government is administered by a mayor, annually elected, and a city council. The water-works are owned and operated by the municipality. Population, in 1890, 6235; in 1900, 6489.

CHECHEN. See TCHETCHEN.

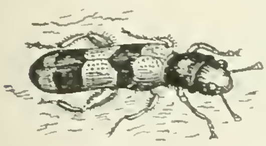
CHECK, or CHEQUE. A bill of exchange (q.v.) drawn on a banker payable on demand. Such is the definition given in the English Bills of Exchange Act, 1882 (45 and 46 Vict., c. 61, § 73), and in the Negotiable Instruments Law, which has been adopted by a number of the United States. (See Laws of New York, 1897, chap. 612, § 321.) In a few States it has been held that an instrument drawn upon a printed blank-check form, and differing from an ordinary check only in that it was payable on a day subsequent to its date, is a check, as distinguished from a bill of exchange. Such was not the prevailing view, however, even before the statutes above referred to. It is not necessary that a check be drawn by a customer on his banker, nor that it be drawn against funds, although ordinarily it is so drawn; and a person who obtains money on a check which he knows is drawn by one not entitled to draw for the amount specified therein commits a fraud and may be liable to criminal punishment. A check is intended for prompt presentment, and not for use as a continuing security; and when presented it is to be paid by the banker and canceled, not accepted and returned to the holder. In this country the usage of certifying checks prevails. The liability of a bank which certifies a check drawn upon it is the same as that of a drawee who accepts a bill. The effect of certification upon the drawer's liability depends upon whether it was procured by the holder or by the drawer. If the drawer procures it, he remains liable on the check as the drawer of an accepted bill of exchange, payable on demand. If the holder procures it, the drawer and indorsers are discharged from liability. In other words, the holder in the latter case chooses to substitute for payment by the bank its promise to pay. Mere delay in presenting a check does not discharge the drawer, unless loss is caused to him thereby. At common law, if the delay did result in loss, as where the bank failed during the period of delay, the drawer was discharged *in toto*. By the English Bills of Exchange Act and the American Negotiable Instruments Law, this has been modified, and he is discharged only to the extent of the loss caused by the delay.

Crossing checks is an English usage which does not prevail in this country. It consists (1) in writing across the face of the check the words 'and company' between two parallel lines, or in simply drawing two parallel transverse lines across the face; or (2) in writing across the face the name of the banker. The first is called a general crossing, the latter a special crossing. A crossed check is payable only when presented through a bank, and one crossed specially is payable only through the bank specified. The usage was introduced as a protection and safeguard to the owner of the check, but it did not restrain the negotiability of the instrument. The Bills of Exchange Act provides that if the crossing is accompanied with the words 'not negotiable,' a person taking the check shall not have, and shall not be capable of giving, a better title than that of the person from whom he took it.

In most respects other than those mentioned above, checks are governed by the rules which apply to bills of exchange. Consult the authorities referred to under NEGOTIABLE INSTRUMENTS.

CHECKERBERRY. See GAULTHERIA and PARTRIDGE-BERRY.

CHECKERED BEETLE. A beetle of the serricorn pentamerous family Cleridæ, so named because of its variegated markings. Many of them are ant-like in form and movement. The adults are found on flowers, such as *Spirea alba*, and on trunks of trees, where they subsist on nectar and sweet sap. The larvæ live under bark, and feed on wood-boring larvæ, even penetrating into the burrows in search of them. Some infest the hives of bees, where they devour the young bees, burrowing their way from cell to cell, and still others feed on dead animal matter. A synopsis of the North American species, by J. L. Le Conte, will be found in the *Annals* of the Lyceum of Natural History of New York, Vol. V. (New York, 1849).



A CHECKERED BEETLE.

CHECKERS (OF. *eschequier*, from ML. *scacarium*, chess-board, from *scacci*, chess, from Pers. *shāh*, king), or DRAUGHTS (Dutch *dragt*, Ger. *Tracht*, burden, from AS. *dragan*, to draw, Ger. *tragen*, to carry). A game played with 'men' on a checkered board, made square, divided into sixty-four equal square spaces, colored alternately black and white. The draughts or checkers are circular and flat. There are many varieties of checkers—Chinese, English, Polish, Spanish, Italian, and Turkish. The game is also found among the native tribes of the interior of New Zealand. In France it is called *les dames*, from its having been a favorite game with ladies: in Scotland the draught-board is called the *dambrod*.

Two persons play this game, each having a set of twelve men—one set black, the other white. The men may be placed either on the black or white squares, but they must all be placed on one color only. In England it is usual to play upon the white squares, with a black square to the lower right, and in Scotland upon the black, with a white square to the lower right. The men may be moved diagonally only, and by one square at a time. If an enemy's man stands in the way, no move may take place unless there be a vacant square beyond into which the piece can be lifted. The man leaped over is then taken and removed from the board. The object of the game is to clear the board of the enemy's men, or to hem them in so that they cannot be moved, and whichever party does so first wins the game. As no piece can move more than one step diagonally at a time, there can be no taking till the antagonists come to close quarters, and the advancing of them cautiously into each other's neighborhood is the chief art of the game. When a man on either side has made his way, either by taking or by a clear open path, to the opposite side of the board, he is entitled to be 'crowned,' which is done by placing another man on the top of his man. Crowned men may move either backward or forward, but always diagonally and by one square at a time, as before, and this additional power gives a great advantage to the player who owns the greatest number of 'kings,' and usually decides the game in his favor. Joshua Sturges's work, entitled *The Guide to the Game of Draughts*, first printed in 1800, edited by Kean and last published in 1892, is the standard authority. The rules and many diagrams will be found in *Spalding's Home Library* (New York).

CHECKING. In arithmetic, one of the oldest and best methods of checking the results of operations in decimal arithmetic is known as *casting out nines*. It originated at an early date among the Hindus, and from them it passed to the Arabs. Proofs for this rule appear in the works of Avicenna in the Tenth Century. Luca Pacioli (1494) adds this check to his work on division, pointing out cases in which it fails. Its use in elementary schools has been neglected more on the Continent of Europe than in England, and not until recently has the method been seriously urged by American teachers. The process may be best explained by an example.

Required to check the multiplication, $35 \times 34 = 1190$:

(1) Dividing 35 by 9, the remainder is 8;

(2) Dividing 34 by 9, the remainder is 7:

(3) Dividing 56 (the product of 7 and 8) by 9, the remainder is 2;

(4) Dividing 1190 by 9, the remainder is likewise 2.

But $2 = 2$; therefore the product, 1190, is correct.

According to a proposition in the theory of numbers, the remainder arising from dividing a number by 9 (called the *excess*) is the same as that arising from dividing the sum of the digits by 9. Hence, the above remainders may be obtained thus: (1) $3 + 5 = 8$; (2) $3 + 4 = 7$; (3) $5 + 6 = 11 = 9 + 2$; (4) $1 + 1 + 9 + 0 = 9 + 2$; but $2 = 2$ as before.

In the case of addition, the excess in the sum is equal to the excess in the sum of the excesses of the addends. Thus, in $635 + 234 = 869$, $6 + 3 + 5 = 9 + 5$, $2 + 3 + 4 = 9 + 0$, $8 + 6 + 9 = 2 \times 9 + 5$, but $5 + 0 = 5$; therefore the sum 869 is correct.

From the identity of division, dividend = divisor × quotient + remainder, it appears that the excess in the first member must equal that in the second. Hence, the check for division is made to depend upon that for addition and multiplication. Thus, in $8765 = 42 \times 208 + 29$, $8 + 7 + 6 + 5 = 2 \times 9 + 8$; $4 + 2 = 6$, $2 + 0 + 8 = 9 + 1$, $2 + 9 = 9 + 2$; $6 \times 1 + 2 = 8$; but $8 = 8$, therefore the division is correct.

In practice, the sum of the digits is rarely found. As soon as the addition produces 9, this is rejected, and so on. Thus, in 180136, $6 + 3 = 9$, $1 + 0 + 8 = 9$; hence, 1 is the excess.

If the result obtained from any operation differs from the true result by a multiple of 9, the check evidently fails, as is also the case if the result differs from the true result by having certain digits interchanged. These cases, however, rarely occur. Any number could be chosen for the purpose of checking, but the excess for 9 is easier found than that for any other number not having more exceptions to its efficiency.

The method of casting out nines is only one of several important checks used in mathematical operations. In algebra, one of the principal checks is that of arbitrary values. Thus, in the multiplication of $a^2 + 2ab + b^2$ by $a + b$, the product is $a^3 + 3a^2b + 3ab^2 + b^3$. This may be checked by substituting any arbitrary values for a and b, as $a = 2$, $b = 3$, giving $5 \times 25 = 125$. There is also the check of homogeneity, likewise illustrated by the above multiplication, where the product of two homogeneous functions of degrees 2 and 3 respectively is also homogeneous of degree $2 + 3$. Functions which are, as in the above case, symmetric with respect to certain letters, also give rise in general to functions symmetric with respect to those letters when one is operated upon by the other, thus suggesting a simple check. The use of checks characterizes the work of all who have to perform operations of various kinds in any of the branches of mathematics, and the importance of the subject can hardly be overestimated. Consult Beman and Smith, *Higher Arithmetic* (Boston, 1895).

CHECKY, chĕk'ĭ, or **CHEQUEE**, chĕk'ē (OF. *escheque*, from *eschequer*, to check). The name given in heraldry to a field or charge composed of small squares of different tinctures, generally metal and color.

CHEDDAR CHEESE. See CHEESE; CHEESE-MAKING.

CHEDORLAOMER, kĕd'ôr-lȧ-ō'mẽr. A king of Elam, who, according to Gen. xiv., conquered Palestine, but thirteen years later was forced to make an invasion in order to establish his authority. He was accompanied by Amraphel (q.v.) of Shinar, Arioch (q.v.) of Ellasar, and Tidal of Goyim. Having conquered the Rephaim, the Zamzummim, the Emim, and the Horites, and proceeded as far as El Paran, he returned by way of El Mishpat, slew the Amalekites and the Amorites in Hazezon Tamar, and defeated in a pitched battle the five kings of Sodom, Gomorrah, Admah, Zeboiim, and Zoar, but was smitten near Dan by Abram, who rescued his nephew, Lot. The historical character of this narrative cannot be maintained. Chedorlaomer is indeed a possible Elamitish name, as Kudur occurs in Kudur nanchundi and Kudur nabuk, and Lagamam or Lagamal is the name of an Elamitish goddess. Three cuneiform tablets have been found dating from the early Seleucid and the Arsaeid periods, in which some scholars have seen a reference to King *Kudur Lagamar*, but the name in the first is only *Kudur Ku Ku mal*, in the second *Kudur nuch* (?) *qu mal*, and in the third, *Kudur nuch* (?) *qu*; the first also has the names *Eri Eaku* and *Tundchula*, and the second *Eriekua*. When these men lived cannot be determined. An invasion of Palestine by an Elamitish king is not improbable. But there is as yet no evidence from the monuments of any of these kings. It is regarded as most probable that the names were found by some Babylonian Jew and put into connection on the one hand with the symbolical and fictitious names of the kings of the submerged cities (see SODOM); on the other, with Abram. This *midrash* is supposed to have been written in the Fourth Century B.C., and it is possible that the appendix in which Melchizedek (q.v.) figures is even later. Consult, especially, King, *Letters and Inscriptions of Hammurabi I.* (London, 1898).

CHEDU'BA. An island off Arakan, Burma, in the Bay of Bengal, stretching from latitude 18° 40' to 18° 56' N., and from longitude 93° 31' to 93° 50' E. Area, 240 square miles. Population, 24,000 (Map: Burma, B 3). The soil is fertile, yielding rice, tobacco, sugar, indigo, cotton, hemp, and large quantities of a vegetable oil, equally fitted for burning and for varnishing. The principal mineral is petroleum. The island is of volcanic origin, and the coast has earthy cones, which emit mud and gas. The small town of Cheduba, or Manaung, in the northeast, has a population of 2000.

CHEE'CHA (native name). A gecko (*Hemidactylus frænatus*) of Ceylon, India, and the Orient, four or five inches long, which is semi-domesticated. "It makes its appearance soon after sunset, about the walls of the Indian dwellings, in search of flies and other small insects. If some attention be shown it, however, it will present itself every evening at the accustomed place, . . . soon becoming very tame." See GECKO.

CHEE'LA, or **CHILA.** See SERPENT-EAGLE.

CHEER, or **CHIR.** See PHEASANT.

CHEER'YBLE, FRANK. The nephew of the Cheeryble brothers in Dickens's *Nicholas Nickleby*. He becomes the husband of Kate Nickleby.

CHEERYBLE BROTHERS, THE. Twin brothers, Charles and Edwin by name, who are benevolent friends to Nicholas and Kate in Dickens's *Nicholas Nickleby*. They are a pair of impulsive, warm-hearted London merchants, who are customarily clad in "broad-skirted blue coats, drab breeches, high gaiters, and low-crowned, broad-brimmed white hats," and whose double chins "rest in the folds of white neckerchiefs." They are said to be drawn from the Grant brothers who were Manchester cotton-spinners in Dickens's day.

CHEESE (AS. *cēse*, from Lat. *caseus*, cheese). A food product made from milk by separating the curd or casein and portions of the fat and other constituents from the whey, shaping the mass into different forms, and usually ripening or curing it. The product has been known since earliest times, the oldest mention of it dating back to about B.C. 1400. It was a common food material long before butter was known, the references to butter in the Bible being more correctly translated, 'curdled milk.' The Greeks were familiar with cheese-making at the time of Homer, and Aristotle refers to the renneting of milk with the sap of the fig. Hippocrates mentions cheese made from mare's milk and from goat's milk. Sheep's milk was employed for this purpose by the early Egyptians. The Romans used cheese as food quite extensively, and were familiar with several kinds, one similar to Limburger, others flavored with spices and herbs, and some which were smoked in the process of making. Columella gives a very good description of the methods employed in cheese-making, and Pliny describes the foreign cheeses to be had in Rome, some of which were quite celebrated.

At the present day more than one hundred and fifty different kinds of cheese made in Europe and America have been described. These depend for their characteristics upon the kind and condition of the milk used, the process of making, the seasoning, and especially upon the conditions incident to the ripening or curing. (See CHEESE-MAKING.) Cow's milk is, of course, mainly used, but in some parts of Europe the milk of goats and sheep is also employed. The milk may be sweet or sour, it may contain different amounts of fat, depending upon whether whole milk, skim milk, or milk to which cream is added is used, and the cheese may be hard or soft, according to the amount of water left in it and the character of the curing. The principal hard cheeses are the common Cheddar cheese, the English Cheshire, Gloucester, Wiltshire, and Stilton, the Dutch Gouda and Edam, the Schweitzer (Swiss) or Emmenthaler (known also as Gruyère), and the Italian Parmesan and Gorgonzola. Among the soft cheeses are Brie (*Fromage de Brie*), Camembert, Neuchâtel, Limburger, 'brick,' Philadelphia cream, and cottage cheese, or 'smierkäse.' The famous Roquefort is a semi-soft cheese. In addition to these, there are many fancy brands of cheese, made in the United States and Canada, by mixing ground cheese with cream, or butter, or oils, and sometimes adding a flavoring material, such as Meadow-Sweet, Club-House, Canadian Club, etc. Pineapple cheese is ordinary cheese made very firm and pressed into the shape suggested by its name. In composition, cheeses of the same general variety vary quite widely, owing to differences in the richness of the milk used, the amount of water left in the curd, and the age of the product. As cheese ripens and ages it dries out considerably, losing from 8 to 15 per cent. of its water. The water in ordinary factory cheese varies all the way from 15 to over 50 per cent., although in well-cured cheese it usually constitutes about one-third, or 35 per cent. The remainder is solid matter, composed mainly of fat, casein (protein), and a little sugar and ash (mostly salt). Fully one-half of the solids in a whole-milk cheese should be fat; in skim-milk cheese the proportion is considerably less. Van Slyke found the average composition of whole-milk cheese made in New York factories to be: Water, 31.5: fat, 37; protein, 26.25: ash, sugar, etc., 5.25 per cent. The average of a large number of American analyses differs but little from this, and is as follows: Water, 34.2; fat, 33.7; protein, 25.9; ash, sugar, etc., 6.2 per cent. The average percentage composition of a number of the more common kinds of cheese is shown by the accompanying table.

KIND	Water	Fat	Protein	Sugar, ash, etc.
Cheddar (American)	34.2	33.7	25.9	6.2
" made from partly skimmed milk	38.2	29.5	25.4	6.9
" made from skim milk	45.7	16.4	31.5	6.4
Pineapple	23.0	38.9	29.9	8.2
Schweitzer	32.7	32.6	29.5	5.2
Edam	34 0	27.4	30.9	7.7
Parmesan	32.7	25.1	36.8	5.4
Stilton (made from milk and cream)	29.1	35.6	27.4	7.9
Cheshire	34.8	29.5	28.6	7.1
Roquefort	38.8	31.5	23.4	6.3
Limburger	42.1	29.4	23.0	5.5
Neuchâtel	43.4	32.3	17.1	7.2
Fromage de Brie	51.4	25.7	17.9	5.0

Many of the foreign cheeses, such as Emmenthaler (Schweitzer), Edam, Neuchâtel, brick, and Limburger, are now successfully made in the United States; but more than nine-tenths of all the cheese made in this country is the familiar standard variety known as Cheddar. The grades of this cheese commonly recognized are: 'Full cream,' made from whole (unskimmed) milk; 'skims,' made from skimmed or partly skimmed milk; and 'filled' cheese, in which foreign fat is substituted for the natural fat of the milk. The latter is the most serious form of adulteration of cheese, and as the product is palmed off as 'full-cream cheese,' it is to be regarded and should be treated as a fraud. Its base is skim milk, which is very abundant and cheap in creamery districts. The fat added is usually oleo oil or neutral lard, and from these cheap materials it is said that filled cheese can be made for 4 or 5 cents a pound. It is not easily detected by ordinary sampling when fresh; but it has little flavor or aroma, and its quality is short-lived. The exportation of considerable quantities of this cheese under fraudulent names has unfavorably affected the export cheese trade of the United States. Several of the dairy States have prohibited its manufacture, and others have enacted laws requiring its proper labeling.

The general reputation of American cheese at home and abroad has also suffered from the extent of the manufacture of skim cheese, or half-skims. While these are regarded as legitimate products, and, if well made, are highly nutritious, they should always be plainly marked and sold for exactly what they are. Unlike the ripe and finely flavored Parmesan cheese, which is made from skim milk, the American skims are generally flat in flavor, hard, and horny. Several of the dairy States, notably New York and Wisconsin, have passed laws authorizing the use of State brands on cheese made from whole milk, guaranteeing the quality of the cheese so branded. Canada has prohibited by law the manufacture of either skim-milk or filled cheese.

The cheese production of the United States in the middle of the last century was about 100,000,000 pounds a year, and at its close about 300,000,000 pounds, from 30,000,000 to 50,000,000 pounds being exported. New York and Wisconsin are the two principal cheese-making States, the former making nearly twice as much as the latter, and both together producing three-fourths of the entire output of the country. Farm-made cheese has been almost entirely superseded by factory cheese. (See CHEESE FACTORY.) Approximately, 1,000,000 pounds of cheese are annually imported into the United States, nearly one-half coming from Switzerland (Schweitzer cheese), and 30 per cent. from Italy.

Food Value.—In proportion to its bulk, cheese is a highly nutritive food, both as regards tissue-forming material (protein) and as a source of energy (fuel value). The few digestion experiments which have been made with cheese indicate that the protein and fat in it are quite thoroughly digested. Well-ripened cheese is more thoroughly digested than green cheese. As regards ease of digestion, it appears that fat cheese, thoroughly ripe cheese, or that which is porous, is more quickly digested than other sorts. The distress which some persons experience after eating cheese may be due to a variety of causes, such as over-indulgence, especially at the end of a hearty meal, eating a concentrated food without proper dilution with other foods, or insufficient mastication. There are undoubtedly some persons who cannot eat cheese, owing to some personal idiosyncrasy not easily explained, just as there are those who cannot eat strawberries or some other food. In general, it may be said that cheese thoroughly deserves the reputation of being a nutritious and wholesome food which it has had for centuries. Cheese is eaten alone, or combined with other food materials. The more highly flavored kinds are most commonly served at dessert and eaten in small quantities, while the mild sorts often replace to a considerable extent meat or other animal food, and constitute an important part of the meal. Occasionally cheese causes a severe, or even fatal, illness. This is due to the growth of peculiar micro-organisms and the consequent production of poisonous substances called ptomaines (q.v.). But these are by no means confined to cheese, and are likely to occur in many other highly nitrogenous foods.

For bean-cheese, or bean-curd, see SOY BEANS.

CHEESE FACTORY. A place where cheese is made on a commercial scale. The first cheese factory in the United States was established at Rome, N. Y., in 1851, by Mr. Jesse Williams, a farmer and skillful cheese-maker. The idea of bringing together daily the milk from several neighboring farms, to be made into cheese by a skillful operator, has spread extensively throughout the dairy States, and has been adopted abroad. In 1869 the number of cheese factories in the United States had reached over 1000, and since that time this coöperative, or factory, system has practically superseded the making of cheese on farms. There are now said to be nearly 3000 factories in the United States. The advantages of the system are diminished cost of production, a more uniform and superior quality of cheese, a higher and more regular price, and a great reduction of labor at the farm. Cheese factories are operated on two plans—namely, the stock-company or coöperative system, under which the farmers own and manage the factory, through proper officers; and the proprietary plan, in which an individual owns and operates the factory, making cheese for the patrons for a certain price, which in New York State is usually one dollar per hundredweight. The milk is hauled to the factory daily by the patrons, the distance being in many instances several miles. Payment for the milk is usually made on the basis of the weight, account being taken of the amount of milk required to make a pound of cheese. The demonstration that the fat content is a reliable index to the cheese-producing value of milk has led some progressive factories to adopt this basis, which is carried out as at creameries (q.v.). There is a wide difference in the size of cheese factories. Some make only five or six cheeses a day, while others make over twenty in the height of the season. An average-sized factory produces from eight to ten cheeses a day, requiring the milk of about 300 cows. The kind made is almost exclusively Cheddar cheese.

CHEESE-INSECTS. Insects affecting cheese are as follows: *Cheese-hopper* or *Cheese skipper*, the larva of *Piophila casei*, a small, black, shining, two-winged fly, which lays its eggs on cheese, smoked ham, and chipped beef. The white, slender eggs hatch in twenty-four to thirty-six hours, and the cylindrical, white, tapering larva feeds voraciously upon the cheese, ham, or beef, completing its growth in from seven to eight days, and remaining in the pupal condition ten days longer. The name is derived from the fact that the larva will bring the two ends of the body together and suddenly release them, like a spring, jumping in this way for 3 or 4 inches. In the United States this insect plays a more important rôle as an enemy of smoked ham than of cheese. It seems to prefer the outer, fatty portions. The substances attacked should be kept in scrupulously clean, well-aired rooms, the windows should be screened through the summer, and all shelf-cracks should be occasionally washed out with a kerosene emulsion. *Cheese-mite*, a minute, whitish, gregarious mite (*Tyroglyphus siro*) of a genus destructive to flour, sugar, etc., which feeds upon cheese, leaving a brown, powdery mass of shed skins where it has worked. Cleanliness in the place where cheese is kept is the best preventive.

CHEESE-MAKING. The making of Cheddar cheese, which is the common cheese made in the United States and Canada, and also extensively in England, may be taken as illustrating the general principles upon which the process depends. The milk used should be free from taint or smell, and of good quality as regards composition. While the casein of the milk is the part which is curdled and gives the body to the cheese, the fat is an important constituent of the finished product, and it has been conclusively shown that the cheese-producing power of milk is measured by its percentage of fat. Hence the fat content of milk indicates its value for both cheese and butter making. The casein in milk exists in a state of semi-solution, from which it is separated or curdled by acids, as in the case of sour milk, or by rennet extract prepared from the stomachs of young mammals, usually calves. The latter is most commonly used for producing the curd, as the curdled casein is called. The fresh milk is first ripened to the proper degree—i.e. a certain amount of lactic acid is developed in it by keeping it for a short time at about 85° F. The acidity accelerates the action of the rennet. When the milk is sufficiently ripe, the rennet is added in diluted form and stirred in, the milk being held at from 82° to 86° F. Ten or fifteen minutes are required to carry the curdling to the proper stage, after which the curd is cut into small pieces with gangs of steel knives, in order to facilitate the contraction of the curd and the expulsion of the whey. The mass is then stirred gently for about five minutes, and subsequently heated to about 98° or 100°, the result being the formation of more acid and a further shrinkage of the curd. The object in these operations is to separate the whey from the curd with the least possible loss of fat. Most of the fat is inclosed in the curd mechanically, but some little goes into the whey, the amount depending upon the skill of the operator. When the curd has assumed the proper consistency (usually judged by its stringing out in little threads when touched with a hot iron), the whey is drawn off and the curd is allowed to mat together into a solid mass. This is cut up into blocks, which are turned so as to maintain a uniform heat throughout. The development of acid, which continues, changes the character of the curd, and when the hot-iron test shows threads 2 or 3 inches long the curd is ground, or, more properly speaking, cut, and salted, the salt hardening the curd and checking the further development of acid. It is then pressed to bring it into suitable form and remove any surplus whey. After this it is ripened in rooms or cellars kept at a temperature not above 65° or 70° for several weeks, and even months. This ripening is an important and critical part of the process, and has much to do with determining the general quality and character of the cheese. In it the casein is peptonized and changed to forms which are digestible, and the characteristic flavors are developed. If the temperature of the curing-room is too high, the cheese ripens rapidly, but gets off flavor and even spoils: and if the air is too moist, the cheese molds. Low temperature and slow curing are much the safest methods, since they favor the making of cheese of the best quality.

The losses in cheese-making occur in the whey and in drippings from the cheese-press. The albumin, a milk constituent similar to casein, is not coagulated by the rennet, and passes into the whey. This is true also of the milk-sugar, only a little being carried into the curd. The fat of the milk is quite largely (all but 5 or 10 per cent.) recovered in the cheese in careful making. The amount of cheese that can be made from 100 pounds of milk depends upon (1) the skill of the maker, (2) the amount of water left in the cheese, and (3) the composition of the milk. As mentioned above, the richer the milk is in fat, the greater the amount of cheese that can be made from it; but with poor making this increase of fat in the milk may very easily be lost.

In the manufacture of other kinds of cheese than Cheddar, the details of the process are modified somewhat, or different kinds of milk are used, or the ripening process is different. In the case of a number of kinds special ferments are introduced into the curd to bring about desired characteristics and flavors. This is true of Roquefort cheese, which was originally made from sheep's milk, but in which some cow's milk is now often used. A mold cultivated upon bread is mixed with the curd, and this gradually permeates the whole mass, giving it a mottled bluish color and imparting a characteristic flavor. The characteristics of Limburger are also due to specific fermentations induced during ripening, which result in a putrefactive odor and pungent taste. This cheese is made from sweet milk, the curd being formed into cakes about 5 inches square and 2 inches thick, and not pressed. The main cause of the putrefactive fermentation during ripening is the extremely moist condition in which it is kept. The surface soon begins to get shiny and soft, becoming reddish-yellow, and this changed condition gradually extends to the centre. Schweitzer or Emmenthaler cheese is made from perfectly fresh, sweet milk—i.e. without ripening—and is of waxy texture, with large 'eyes' or holes distributed evenly through it. The curing covers two stages, and is carried on in two cellars to secure the proper conditions. It requires a number of months, a fine Swiss cheese being at least eight or ten months old before it is eaten.

The spherical dark-red Edam cheese is made quite similarly to Cheddar cheese, the curd being placed in molds to give it its form. It is sometimes made of partly skimmed milk. The curing process is practically the same as for Cheddar cheese, being continued for at least eight or ten months. The color is due to the application of an alcoholic solution of carmine when the cheese is ready for market.

The rich Stilton cheese of England, which is very highly esteemed, is made of milk to which cream is added, and is ripened for two years. This ripening is sometimes assisted by mixing some old grated cheese with the curd. The Italian Parmesan cheese is made from skimmed or partly skimmed milk, much like Cheddar cheese, but is ripened for a much longer time. It is not considered fit for eating until a year and a half old, and the ripening does not reach its height until three or four years old. It is very hard, and keeps almost indefinitely. The familiar cottage cheese, Dutch cheese, or smierkäse, is made of sour milk, no rennet being used, and is eaten while fresh. Part skim milk is often used, or a little cream or butter may be added to the curd. The American Neuchâtel, which comes in little cakes wrapped in tinfoil, is likewise a soft, unripened cheese, to be eaten while fresh, but is made with sweet milk with the addition of rennet. See also CHEESE FACTORY, for more detailed accounts of the processes of cheese-making, and descriptions of other kinds of cheese.

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CHEESE RENNET. See BEDSTRAW.

CHEETA, chē′tȧ, **CHITA** (Hind. *cīta*, from Skt. *citra*, spotted), or HUNTING-LEOPARD. A large tropical cat (*Cynœlurus jubatus*). It forms an aberrant genus of the Felidæ, differing from Felis prominently by its greater comparative length and slenderness of limb, which enables it to run for a short distance with the greatest speed, probably, of any of the larger mammals, and also by the fact that its claws are short, blunt, and almost non-retractile. It therefore pursues its prey by chase rather than by stealth, and to these dog-like characteristics adds a docility unusual among cats. It is about the length of the leopard, but stands much higher; in color it varies from tawny to bright rufous, lighter underneath, marked everywhere except on the throat with small, solid spots of black, which are neither rosettes nor arranged in lines; the length of the crisp, erectile hair ('hackles') on the neck and shoulders is another feature. See Plate of WILD CATS, under CAT.

The cheeta is distributed over nearly all Africa, but commonly only in the equatorial jungles, and thence sparingly eastward to India. It is in southern India that it is best known, because there it is kept tame and trained by many wealthy natives for the chase of black-buck, etc. The methods of training are described by J. L. Kipling (*Beast and Man in India*, London, 1891), and result often in producing a harmless household pet. When taken hunting it is driven in a cart, leashed and hooded, so that the sport resembles falconry. As soon as the game is sighted the attendant removes the hood, the cheeta, quivering with excitement, understanding perfectly the meaning of the movement; and then the freed animal, after a glance to find its prey, rushes forward, overtakes and drags it down; it will, however, use catlike stealth should circumstances suggest. The game is never brought back, but held by the cheeta, which must be found quickly and captured—an operation requiring skill, for its native ferocity has been aroused. Having been rewarded with a draught of blood, it is rehooded and confined. The sport (to which the caracal has occasionally been trained for the chase of birds) is of very ancient date, as appears from its depiction on early Assyrian and Egyptian monuments. It was introduced into Europe by returning Crusaders in the Fourteenth Century, and flourished for two centuries in Italy and France. For particulars consult article by J. E. Harting in *The Field* (London, December 26, 1885). For general description, see *Royal Natural History*, Vol. I. (London, 1894); for wild habits in Africa, Drummond, *Large Game . . . of Southern Africa* (London, 1875); for habits and sport in India, Blanford, *Fauna of British India* [mammals] (London, 1888-91); Baker, *Wild Beasts and Their Ways* (New York, 1890); and Sanderson, *Wild Beasts of India* (London, 1893). Facts and illustrations relating to its use in sport in the Middle Ages may be found in La Croix, *Mœurs et usages des moyen âges* (6th ed., Paris, 1878).

CHEETAL, chē'tŭl, or **CHITAL** (Hind. *cītal*, from Skt. *citra*, spotted). The axis deer.

CHEET'HAM, Henry (1827-99). An English clergyman and religious author. He was born at Nottingham, studied at Christ's College, Cambridge, and in 1856 was settled as curate of Saffron Walden, Essex. He held the vicarage of Quarndon, Derbyshire, from 1858 to 1870, and was consecrated Bishop of Sierra Leone in the latter year. In 1882 he resigned to become Vicar of Rotherham, Yorkshire. He published: *One Hundred Texts of Irish Church Missions; Sermons;* and other works.

CHEETHAM, Samuel (1827—). An English divine and theologian of the Established Church, Archdeacon and Canon of Rochester. He was born at Hambleton, educated at Christ's College, Cambridge, and was fellow there in 1850 and assistant tutor in 1853-58. From 1863 to 1882 he was professor of pastoral theology at King's College, and from 1879 to 1882 Archdeacon of Southwark. He was an editor of the *Dictionary of Christian Antiquities* (1875-80), and published: *A History of the Christian Church During the First Six Centuries* (1894); *The Mysteries, Pagan and Christian* (1897); and *Mediæval Church History* (1899).

CHEE'VER, Ezekiel (1615-1708). An American educator. He was born in London, but came to New England in 1637, and assisted (1638) in founding New Haven, where he became prominent as a deacon, a minister, and especially as a teacher. He also taught in Ipswich and in Charleston, and was at the head of the Boston Latin School for thirty-eight years. He prepared the *Accidence, a Short Introduction to the Latin Tongue*, which was used as a text-book for more than a century, and wrote *Scripture Prophecies Explained*.

CHEEVER, George Barrell (1807-90). An American Congregational clergyman. He was born in Hallowell, Maine, and graduated at Bowdoin College in 1825, and at the Andover Theological Seminary in 1830. Two years later he was installed as pastor of a Congregational church in Salem, Mass. The Unitarian controversy attracted his attention, and he was an earnest defender of the orthodox system. Temperance also became a leading idea, and in 1835 he published in a Salem newspaper "Deacon Giles's Distillery," a bitterly satirical allegory which had a wonderful popularity. The author was prosecuted and imprisoned a month for libel. He then traveled for some time in Europe, and, on his return in 1839, became pastor of the Allen Street Presbyterian Church in New York. He resigned in 1844, and from 1846 until his retirement in 1867 was pastor of the Church of the Puritans, New York. During the fierce debate that preceded the Civil War, he was an active and uncompromising anti-slavery advocate. At an early age he began to contribute to the *North American Review*, and later wrote much for the *Independent* and the *Bibliotheca Sacra*. Among his published works are: *Studies in Poetry* (1830); *Lectures on the Pilgrim's Progress* (1843); *Wanderings of a Pilgrim* (1846); *Journal of the Pilgrims at Plymouth in 1620* (1878); and *God Against Slavery* (1857).

CHEFOO. See Chifu.

CHEGGS. A market gardener in Dickens's *Old Curiosity Shop*. He marries Sophie Wackles, to the discomfiture of Dick Swiveller.

CHEHA'LIS. A river in the southwestern part of the State of Washington. It rises in Lewis County, flows through Chehalis County, and empties into Gray's Harbor after a course of about 125 miles. The stream is navigable some distance for light steamboats.

CHEIRANTHUS, kī-răn'thŭs. See Wallflower.

CHEIROLEPIS, kī-rŏl'ē-pĭs. See Chirolepis.

CHEIROMANCY. See Chiromancy.

CHEIROTHERIUM, kī'rō-thē'rĭ-ŭm (Neo-Lat., from Gk. *χείρ*, *cheir*, hand + *θηρίον*, *thērion*, dim. of *θήρ*, *thēr*, beast). The name given by Dr. Kaup to the animal which produced the peculiar hand-like impressions on the Triassic rocks of this country and Germany. The remains of the animal having been found and its structure made out, this name has given place to the more characteristic one of *Labyrinthodon*. See Stegocephalia.

CHEKE, Sir John (1514-57). An English scholar, one of the revivers of classical learning in England during the Sixteenth Century. He was born at Cambridge, June 14, 1514, and became a fellow of Saint John's College in 1529. While at the university he devoted himself assiduously to the study of Latin and Greek, particularly the latter language, then much neglected in England. When the first regius professorship of Greek was founded in Cambridge by King Henry VIII., Cheke was appointed to the chair. In 1544 he became tutor to Prince Edward (afterwards Edward VI.), whose elevation to the throne secured him wealth and distinction. He became a member of Parliament in 1547, provost of King's College, 1548, and was knighted in 1552.

When Mary came to the throne Cheke, being a Protestant, was stripped of all his possessions and after having been imprisoned fled to the Continent. In 1556 he was seized in Belgium by the agents of Philip II. of Spain and brought back to England. Being now compelled to choose between the stake and the Catholic religion, he accepted the latter. He died September 13, 1557. Of his numerous writings, the most remarkable is his translation of the *Gospel of Saint Matthew*, edited by Goodwin (1843). Consult Strype, *Life of Cheke* (Oxford, 1821).

CHEKH (chĕĸ) **LANGUAGE AND LITERATURE.** See Czech Language and Czech Literature.

CHE-KIANG, chĕ′kê-äng′ (Chinese, crooked river). A maritime and eastern province of China, bounded by the province of Kiang-Su on the north, the Pacific on the east, Fu-Kien on the south, and Kiang-Si and Ngan-Hui on the west. The Chusan Archipelago is also a part of the province. It is the smallest of the eighteen provinces, and one of the oldest and most fertile parts of the empire, 34,700 square miles in area. Drained by fourteen large rivers (and the Yang-tse-kiang once had a mouth here) and many smaller streams, it produces abundantly tea, rice, cotton, silk, wheat, indigo, and other crops, while the forest and fruit trees comprise every species known in eastern China, so that the people have little need to import materials for food or clothing. Its capital is Hang-chow, the centre of the silk district, and on the line of China's projected railway system. Ning-po is the chief seaport. Other important cities are Wen-Chau, a treaty port in the south, and Hu-Chau in the north. In 1899 Italy attempted to gain part of this province, but failed. Population, in 1896, 11,843,000.

CHELAN, chē′lăn, Lake. A serpentine sheet of water in the Okanogan country, State of Washington, situated amid picturesque mountain and glacier scenery (Map: Washington, E 1). It is over 40 miles long and from 2 to 3 miles wide. It is fed by the Stehekin or Pierce River, on which are the famous Rainbow Falls, 300 feet high, 3 miles above the entrance to the lake. The lake drains at Chelan Falls into the Columbia River. Stehekin, Moore, Johns, and Chelan on its banks are summer resorts. Steamers ply on its waters, and there are fine angling and shooting in the district.

CHELARD, she-lär′, Hippolyte André Jean Baptiste (1789-1861). A French musician, born in Paris. He studied under Fétis, and at the Paris Conservatory under Gossec and Dourlen. In 1811 he won the Grand Prix de Rome, and became in Italy a pupil of Baini, Zingarelli, and Paisiello. His first opera, *La casa à vendere* (1815), was produced in Naples; but his second, *Macbeth* (book by Rouget de Lisle), was not brought out till 1827. Its failure discouraged Chelard, who retired to Munich and rewrote the entire work. In revised form it met with considerable success, and its composer was appointed Court Kapellmeister of Bavaria. In 1829 he returned to Paris and opened a music store, but upon its destruction in the Revolution of 1830 he returned to Munich. He conducted German opera in London (1832-33), and in 1836 was called to Weimar as Kapellmeister of the Grand Duke. His successful operas, *Der Student* (1831); *Mitternacht* (1831); *Die Hermannsschlacht* (1835), his best work; *Der Scheibentoni* (1842), and *Der Seekadett* (1844), were all produced in Germany. He died in Weimar. A posthumous opera, *L'Aquila romana*, was produced in 1864 in Milan.

CHELIDONIUS, kĕl′ĭ-dō′nĭ-ŭs, Benedictus (?-1521). A Benedictine monk. His true name was Schwalbe ('a swallow'), of which the name by which he is better known is a Græco-Latin punning translation. While in the abbey of Saint Egidius, in Nuremberg, built by the Emperor Conrad III., in 1140, for the Scotch Benedictines, he wrote, in 1511, the Latin verses to Albert Dürer's cartoons on "The Apocalypse," the "Passion of Christ," and the "Life of the Virgin Mary," besides poems on his monastery and its abbots. His love of learning earned him the nickname 'Musophilus.' In 1515 he became abbot of the Scotch Benedictine monastery of the Virgin Mary in Vienna, and there he died, September 8, 1521.

CHELIUS, ĸā′lĭ-o͞os, Maximilian Joseph von (1794-1876). A German physician. He was born in Mannheim, and was educated at the University of Heidelberg. He was professor of surgery in Heidelberg from 1817 to 1864, where he contributed greatly to the advancement of the science. His more important works include: *Handbuch der Chirurgie* (8th ed., 1858); *Ueber die Heilung der Blasen-Scheidenfisteln durch Kauterisation* (1845); *Zur Lehre von den Staphylomen des Auges* (1858).

CHELLÉAN, shĕl′lā′äN′. The designation applied by French archæologists to the epoch represented by the oldest (Pleistocene) relics of man in Europe, named from Chelles, in the Department of Seine-et-Marne. The climate of the Chelléan epoch was warm and humid, and the flora of the Seine Valley was that of the Mediterranean Basin. Man belonged to the dolichocephalic Neanderthal type, and is supposed to have been contemporary with the hippopotamus, rhinoceros, and *Elephas antiquus*. The fact of man's existence there rests on the occurrence in vast numbers of the leaf-shaped, chipped flint implement called by the French Chelléan. Consult Mortillet, *Le Préhistorique* (Paris, 1900).

CHELLES, shĕl, Jean de (? -c.1270). A French architect and sculptor, famous for having built and decorated the beautiful end of the south transept of Notre Dame in Paris (begun in 1257), with its sculptured portal and rose window. The contemporary chapels of the nave are also probably by him, and part of the old Louvre.

CHELMINSKI, chĕl-mĭn′skê, Jan (1851—). A Polish genre and landscape painter. He was born at Brzostov, Russian Poland, and studied at the Munich Academy and with Franz Adam. Among his principal works are the following: "Stag Hunt in the Time of Louis XV.;" "Morning in the Ukraine;" "Huntsman on Horseback;" "An Afternoon in Hyde Park, London" (1888);

"Review of the First Cavalry Brigade by Prince Luitpold of Bavaria" (1888).

CHELMSFORD, chĕmz'fērd. The county-town of Essex, England, at the confluence of the Chelmer and the Cam, 26 miles east-northeast of London (Map: England. G 5). The town contains factories for making agricultural implements and electric appliances, iron-foundries, breweries, and grain-mills. Its chief trade is in agricultural produce. It has large and important corn and cattle markets. Population, in 1901, 12,600. Chelmsford belonged to the Bishop of London from Anglo-Saxon times to 1545. It was a prosperous town under the Edwards.

CHELMSFORD, Frederick Augustus Thesiger, second Baron (1827—). A British general. He was educated at Eton, and entered the army at the age of seventeen. He served before Sebastopol and in the Indian Mutiny; was adjutant-general in the Abyssinian campaign of 1867-68; and commanded the forces in the Kaffir and Zulu wars of 1878 and 1879. He reached the rank of general in 1888, and retired in 1893.

CHELONIA, kė-lō'nĭ-ȧ (Neo-Lat. nom. pl., from Gk. χελώνη, *chelōnē* tortoise), or Testudinata (Neo-Lat. nom. pl., from *testudo*, tortoise). An order of reptiles, having the body protected above and below by bony expansions forming shields usually covered with horny plates. It is the least variable of the reptilian group, and comprises the turtles, tortoises, terrapins, carets, etc. See Tortoise and Turtle, under which heads a description of fossil forms will also be found.

CHELSEA, chĕl'sė (AS. *Celchyp*. Chalkport, from *cele*, chalk + *hyp*, port). Formerly a suburban village of London, England, on the north bank of the Thames, four and one-half miles southwest of Saint Paul's, and now a metropolitan and Parliamentary borough of Greater London (q.v.). From the Sixteenth to the Eighteenth Century it was a place of aristocratic habitation, and is now the chief literary and artistic residential section of London. During the Nineteenth Century George Eliot, Rossetti, and Carlyle, 'the Sage of Chelsea,' were residents. The celebrated Ranelagh and Cremorne Gardens were situated here. Bridges connect Chelsea with Battersea, on the south bank of the river. Its features of note are the Chelsea Hospital for Superannuated and Invalid Soldiers, founded by Charles II. in 1682; the Royal Asylum for Soldiers' Children; military barracks; the old Church of Saint Luke's, built in 1307-27, and one of the most interesting of metropolitan parish churches; the Sloane Botanic Gardens; the London Water-works of 1772, and the 'Embankment,' a favorite riverside promenade. Chelsea porcelain has been famous since the Eighteenth Century. Population of borough, in 1891, 72,951; in 1901, 73,856. Consult: Martin, *Old Chelsea* (London, 1888); Beaver, *Memorials of Old Chelsea* (London, 1890).

CHELSEA. A city in Suffolk County, Mass., and a suburb of Boston, from which it is distant 2 miles, on the Boston and Maine Railroad (Map: Massachusetts, E 3). It is connected with Charlestown by a bridge across the Mystic River, and with Boston by ferry and steam and electric railroads. The principal public buildings are the court-house, city hall, the United States naval and marine hospitals, soldiers' home, Fitz Public Library, and Odd Fellows' and Masonic halls. The city contains also Union Park and public playgrounds, and a soldiers' monument. Though Chelsea is principally a residential place, it has manufactures of rubber goods, woolens, foundry and machine-shop products, shoes, brass goods, stoves and furnaces, tiles, pottery, etc. The city owns and operates its water-works. The government is conducted under a charter of 1894, revised 1899, which provides for a mayor, elected annually, and a board of aldermen, the majority of whom are elected at large for two years, the remaining members being chosen annually, one from each city ward. The board of aldermen elects the city clerk, treasurer, solicitor, auditor, assessors, messenger, clerk of committees, and commissioners of sinking fund, and, upon nomination of the executive, all other municipal officials. The mayor's clerk alone is appointed by the mayor. The annual income of the city is about $425,000; the principal expenditures are: $35,000 for the police department, $30,000 for the fire department, and $120,000 for schools. Population, in 1890, 27,909; in 1900, 34,072.

First settled in 1626 as Winnisimmet, Chelsea was part of Boston from 1634 to 1638, when it was incorporated as a town under its present name. Here, in May, 1775, occurred a sharp skirmish between a body of British troops and a thousand Americans under Stark and Putnam, the latter being victorious. Chelsea was incorporated as a city in 1857. Out of parts of Chelsea the present towns of Winthrop and Revere were created. Consult Winsor, *Memorial History of Boston* (4 vols., Boston, 1880-81).

CHELSEA. A town and county-seat of Orange County, Vt., 21 miles south by east of the State capital, Montpelier (Map: Vermont, E 6). It has manufactures of lumber and dairy products. Population, in 1890, 1230; in 1900, 1070.

CHELSEA CHINA. Chinaware made in Chelsea, England, between 1745 and 1784. Its leading marks are an anchor and triangle.

CHELSEA HOSPITAL. An asylum in Chelsea, England, for disabled and superannuated soldiers. It was founded by Charles II., who built the present building in 1682-92, on the site of the College for Religious Controversy (Protestant) founded by James I. in 1609. Originally one day's pay per year and two in leap-year were deducted from the pay of soldiers in service in order to defray the hospital expenses. This deduction, however, has long since ceased, and the asylum is maintained by Parliamentary grant and governed by a board of commissioners appointed by the Crown, who are charged also with the duty of awarding all pensions granted by the British Government. The initial plan of giving all pensioners accommodation in the asylum has been necessarily abandoned, and, with the exception of about 500 or 600, invalided soldiers are now out-pensioners. The appropriations for out-pensioners in the year 1899-1900 was, in round numbers, £1,300,000, as against £33,000 for in-pensioners.

CHELSEA VILLAGE. A former village, now a part of New York. In the early part of the Nineteenth Century it formed the farm of Clement C. Moore, author of "'Twas the Night Before Christmas," who, when on the point of abandoning it on the ground of its distance from the city, was persuaded to sell it in building-lots. The name is still in use by old residents, and is preserved in Chelsea Square, between Twentieth and Twenty-first streets, and Ninth and Tenth avenues, the site of the General Theological Seminary.

CHELTENHAM, chĕl′t'n-*am* (village on the Chelt). A municipal and Parliamentary borough and fashionable watering-place in Gloucestershire, England, eight miles northeast of the city of Gloucester (Map: England, E 5). It lies in a picturesque valley, on the Chelt, a small stream which rises in the adjacent hills and flows into the Severn. It is sheltered on the east and southeast by a semicircle of the Cotswold Hills. The town is regularly laid out and well built, and has fine public promenades, gardens, terraces, and squares. Among its numerous churches, the Parish Church of Saint Mary's, dating from the Fourteenth Century, is a fine example of Gothic architecture. The town was incorporated in 1876. It returns one member to Parliament. The town authorities have shown a desire to give it all modern improvements by installing electric lighting, providing an excellent water-supply and a modern system of sewerage in connection with three large sewage farms. They also maintain a public library, an art school, baths, a cattle market, and slaughter-houses. Cheltenham has become famous for its colleges and schools, among which are the grammar school (founded in 1574), Cheltenham College, training colleges for school-teachers, and many private schools. Its popularity, however, is chiefly due to its mineral springs, considered to be specially efficacious in cases of dyspepsia and affections of the liver. In consequence, such a large proportion of the resident population consists of Anglo-Indians that the town has been nicknamed 'Asia Minor.' The Cotswold Hunt holds its meets here, and draws many visitors during the hunting season. Roman remains have been discovered on the site of the town. It is mentioned in *Domesday Book*, but it was not until the discovery of its mineral springs, in 1716, that it began to rise into importance. The visit of George III. in 1788 set upon it the seal of fashion. Its growth in population in the Nineteenth Century was very rapid. In 1804 it numbered only 3000; in 1841 it had increased to 31,000; in 1891 it was 47,121; and 1901, 49,439.

CHEMICAL FIRE-ENGINE. See FIRE-ENGINE.

CHEMICAL NOTATION. See CHEMISTRY, *Chemical Formulas*.

CHEMISTRY. The science of the various material substances that are capable of existence, of their relations to one another, and of the laws governing their various transformations.

THE NAME. The origin of the word chemistry is uncertain. *Chemia* (or *Chemi*) is the old name of Egypt, and as the art of making gold and silver was first practiced in that country, the *science of chemeia* (χημεία) may have meant originally 'the science of Egypt.' Later, however, at the time of the Alexandrian alchemists, the word was used to denote some substance; and as, on the one hand, the word *chemi* means 'black,' and, on the other hand, the first step in the transmutation of metals is known to have been a process of blackening, we conclude that *chemeia* may at that time have denoted the 'philosopher's stone'—i.e. the substance employed in the process of blackening the metals. Similarly, in the form *al-kîmiyâ*, the term is used also by the early Arabic writers to denote, not their art, but a substance employed in that art. With them, however, the term was used in much the same sense as the word *al-iksir*, and this suggests another possible derivation. The word *iksîr* is derived from the Greek *xēros* (ξηρός), which means *dry*. Possibly, then, the word *kîmiyâ* may have been derived from the Greek *chymos* (χυμός), which means *liquid*; and while at one time both *iksir* and *kîmiyâ* were used to denote a substance, the words *chymeia* (χυμεία) and *alchymy* gradually came to denote the art in which that substance was employed, the substance itself (the philosopher's stone) retaining only the name *al-iksîr*.

THE BRANCHES OF CHEMISTRY. The facts of chemistry have been grouped in a variety of ways, either in the interests of research or according to their usefulness in connection with kindred sciences or with the arts. Hence such titles as Animal, Vegetable, Medical, Astronomical, Metallurgical Chemistry, etc., which in a general way explain themselves. Chemistry proper may be considered as comprising the following four branches: analytical, descriptive, general, and applied. *Analytical chemistry* may be defined as the art of determining the composition of substances; under the names of technical analysis, physiological analysis, etc., many of its methods form an important part of applied chemistry. *Descriptive chemistry* deals with the chemical and physical characteristics of substances; it forms a record of the properties of substances, which are arranged, for convenience of reference or for didactic purposes, in accordance with the principles of general chemistry. The two great subdivisions of descriptive chemistry are *inorganic* and *organic* chemistry, the latter dealing with the compounds of carbon, the former with those of all the other elements. *General chemistry* includes theoretical and physical chemistry, which are usually treated together; theoretical chemistry comprises the laws of the composition and chemical behavior of compounds; physical chemistry treats of the physical properties of compounds, of homogeneous mixtures, and of the physical phenomena (thermal, electrical, etc.) accompanying the transformations of substances in general. *Applied chemistry* comprises all the facts and methods of chemistry that find practical employment. The most important subdivisions of this branch are: (1) Biological chemistry, including the chemical facts connected with physiological and pathological phenomena in animals and plants; (2) agricultural chemistry, which deals with problems of rural economy; and (3) industrial, technological, or practical chemistry, which deals with the uses of chemistry in the arts and manufactures.

THE METHODS OF CHEMICAL PHILOSOPHY. Like any other science, chemistry may use two different ways in discovering and demonstrating its general principles. On the one hand—and this is the surest way—a principle may be induced from a large number of experimental observations; it is then nothing but the statement of a general fact, and is termed an *em-*

pirical law. Thus, the principle of the conservation of matter is an empirical law. Perhaps this law may suggest itself *a priori;* but as a law of science it has been induced from facts established by the balance. On the other hand, there are problems which cannot be attacked by experiment. Thus, the problem of the ultimate structure of matter lies far beyond our power of direct observation; yet it is intimately connected with the correlation of substances, and therefore chemistry is compelled to consider it for purely practical reasons. In cases of this nature, chemistry, like any other science, and like speculative philosophy, makes some plausible assumption, termed a *hypothesis.* Like speculative philosophy, it develops the hypothesis, combines it, if necessary, with other assumptions, and thus builds up a *theory.* But at this point, where speculative research reaches its *non plus ultra,* the work of the scientist really begins. The general principles forming part of the theory are busily applied to phenomena capable of direct observation, and then, if their correctness is indicated by actual experiment, they become *theoretical laws.* A scientific theory has for its object, first, to correlate seemingly different facts, and, secondly, to throw light on the road of investigation and lead to the establishment of new facts. Thus, the atomic theory of chemistry has correlated the various chemical substances with regard to their composition and constitution, and it has revealed the possible existence of innumerable compounds many of which have since been actually prepared—an achievement not unlike the discovery of Neptune by theoretical astronomy.

SUBSTANCES.

THE CHEMICAL ELEMENTS. The ultimate decomposition of all known forms of matter has produced over seventy substances which could not be further decomposed, and which are therefore regarded as forming the qualitative basis of all things. None of the substances which we term elements has been broken up into different constituents or changed without gain of weight into some other substance, in any of the innumerable processes ever employed by man. Moreover, spectroscopic study of the sun and the stars shows that the elements of the earth exist undecomposed also in the heavenly bodies, in spite of the high temperatures prevailing on many of them. Of course it seems strange, and certainly does not appeal to our imagination, that the universe should be made up of several kinds of matter essentially different from one another. We should like to think of the elements as representing outwardly different forms of some primary matter pervading all space and making up all things. As a matter of speculation, views of this nature are even now held by many eminent chemists, although no actual step has yet been taken in the direction of making them part of science. Yet the view that the chemical elements are related to one another in some mysterious way is supported not only by speculation, but also by the fact, long known, that certain elements are quite similar in their properties. Chemists have well known for many decades how very closely chlorine, bromine, and iodine resemble one another. Sodium and potassium, too, are so much alike that for most purposes it makes no difference whether we use the hydroxide of the one (caustic soda) or the hydroxide of the other (caustic potash). A large number of facts of this nature have been systematized by Mendeléeff and Lothar Meyer, who have shown (1869) that not only the elements just mentioned, but the rest of the elements, too, can be arranged in groups, the members of which are quite similar in their properties. This remarkable relation, extending as it does to all the well-known elements, can hardly be considered accidental; it must have a cause, and that cause must lie in some hidden relationship uniting the elements themselves, and at the same time rendering them quite distinct from all other forms of matter—i.e. from substances that can be decomposed by the ordinary physical and chemical agencies. See PERIODIC LAW.

CHEMICAL COMPOUNDS. The conception of the qualitative unity of a chemical element defines clearly the distinction between elementary substances on the one hand and compounds and mixtures on the other. The distinction between a chemical compound and a mixture is not easy to define precisely and generally. But before we proceed to formulate this latter distinction, it may be well to consider two simple cases illustrating the formation of true chemical compounds.

First, when hydrogen and oxygen are mixed in certain proportions at ordinary temperatures, a gas is obtained which still exhibits the properties of the two constituents, each of which behaves just as if the other was not present. If the walls of the vessel containing them are porous, both diffuse out, but the hydrogen diffuses out more rapidly; and so it would be if the two gases were confined in porous vessels separately. Now, if we should apply to our mixture sufficient heat, a remarkable change would suddenly set in—an explosion would take place, the hydrogen as well as the oxygen would cease to exist as such, and a new substance (water) would be found in their place. By suitable methods (e.g. by the use of a galvanic current) water may be decomposed into hydrogen and oxygen; but while it exists as water, it has a set of properties all its own, and does not exhibit any of the properties of either hydrogen or oxygen.

Secondly, if finely divided iron and finely divided sulphur should be carefully mixed in certain proportions and left at ordinary temperatures for any length of time, the two would continue alongside each other, iron as iron, sulphur as sulphur. A microscope would show two different kinds of particles. A magnet would separate out the iron and leave the sulphur. But, again, if we should heat the mixture, a change would take place, accompanied by an evolution of heat and light, and, as a result, we would find a substance (sulphide of iron) which has none of the properties of either sulphur or iron, although these substances may be obtained from it by suitable methods of decomposition.

It is therefore clear that a chemical compound is an 'individual' with properties peculiar to itself and different from those of its components; in a mixture, each constituent retains its own individuality, and may be recognized by its own properties. A compound is invariably found to be homogeneous, even if examined with a powerful microscope; a mixture may be homogeneous, as in the case of hydrogen and oxygen, or it may be heterogeneous, as in the case of iron and sulphur. In separating the constituents of a mixture, advantage is taken of the differences in their properties—in the case of hydrogen and oxygen, the difference in diffusibility: in the case of iron and sulphur, the fact that iron possesses magnetic properties while sulphur does not. The properties oftenest taken advantage of for separating substances without destroying their individuality are *volatility* and *solubility:* and on these are based, respectively, the processes of distillation and crystallization.

When a sufficiently stable chemical compound is subjected to one of these processes, and is thus gradually divided into two or more portions, the latter are qualitatively identical with one another and with the whole. Thus, when pure water is subjected to distillation, its composition remains unchanged while any portion of it is being removed. The successive portions of the escaping vapor, too, must have the same composition—viz. that of pure water. Similarly, in the case of pure alcohol, when part of a given amount is removed by distillation, the portion remaining undistilled, as well as the distillate, cannot be anything but pure alcohol, and hence cannot but have the same composition as the liquid before the distillation. Quite different is the case of mixtures. Let, for example, a liquid made up of alcohol and water be subjected to distillation, and let the process be discontinued when a portion of the liquid has passed over. The liquor remaining behind undistilled will then be found to be much weaker—i.e. to contain a greater proportion of water—than the original liquor before the distillation. On the contrary, the escaping vapor will be found to contain a smaller proportion of water than the original liquor before the distillation. The reason is mainly in the fact that water and alcohol are not equally volatile in the mixture; and, of course, the more volatile constituent—viz. alcohol—distills over more rapidly than water, the less volatile constituent. The process of distillation is very often actually employed by chemists when it is required to ascertain whether a given liquid represents a single compound or a mixture. During crystallization, too, a single substance must obviously remain unchanged. Let, for example, a given amount of magnesium sulphate (Epsom salt) be dissolved in water and allowed to crystallize; any portion of the crystalline matter separating out must obviously have the same composition as the given salt. On the contrary, if every crystal of a given substance contains two or more different compounds — say, magnesium sulphate and zinc sulphate—then any portion crystallizing out from the solution will be found to have a composition quite different from that of the given substance. The reason is mostly in the fact that the constituent substances of a mixture are not equally soluble in water; and, of course, the less soluble constituent will tend to crystallize out more rapidly than the constituent whose solubility is greater.

It must, however, be remembered that certain mixtures, too, retain their chemical composition unchanged when divided into two or more fractions by distillation or crystallization. Thus, alcohol containing about 2 per cent. of water will remain absolutely unchanged if divided into fractions by distillation; each fraction will still contain the same percentage of water. A certain mixture of water and nitric acid, and mixtures of certain other substances, are known to behave in the same way. At one time these mixtures were actually taken to be chemical compounds. This view, however, was discarded as soon as it was shown that the composition of such mixtures can be readily changed by changing the conditions under which the distillation or crystallization takes place. If such a mixture is, namely, distilled in an apparatus connected with an air-pump, the temperature at which the distillation takes place can be lowered by lowering the pressure, and then the composition will be found to have changed considerably if the liquid is examined after a part of it has passed over. No such thing can be observed in the case of a single chemical compound. Water, for instance, may, by varying the pressure with the aid of an air-pump, be distilled at any ordinary temperature, yet its composition will of course remain unchanged. See DISTILLATION.

In accordance with the above considerations, a chemical compound may be defined as *a homogeneous substance which can, by suitable methods, be broken up into elements, but whose composition is not changed by fractional distillation or crystallization carried out under variable conditions of temperature.* This definition is sufficient for most purposes of theoretical and practical chemistry.

THE ATOMIC THEORY. Once we have made certain that we will not, by insufficient definition of our concepts, confound mixtures of substances with isolated chemical compounds, we are ready to undertake the investigation of compounds, their physical and physiological properties, their composition, and their constitution and reactions —i.e. their chemical properties. The physical properties, such as color, crystalline form, solubility in various solvents, the boiling or melting point, etc., serve the purpose of readily identifying known compounds. A knowledge of the physiological properties of compounds is desirable, because compounds are often capable of therapeutic action, and may, therefore, be used in medicine. The theoretical chemist, however, is interested in all such properties only inasmuch as they are manifestations of the intimate nature of the compounds characterized by them, and his principal aim is to find a precise expression for the dependence of properties on chemical composition and constitution.

The composition of a compound is revealed by chemical analysis, which shows (1) what the constituent elements are (qualitative analysis) and (2) in what relative quantities those elements are contained in the compound (quantitative analysis). A remarkable law that governs the quantitative composition of compounds became known about the beginning of the Nineteenth Century. This law, called 'the law of multiple proportions,' may be enunciated in the following form: There is for every chemical element a characteristic number that represents its combining weight; and the composition of any chemical compound may be represented either by the combining weights of its elements or by simple multiples of those weights. Thus, using the combining weights as we know them at present, we may state the composition of a few compounds as follows: Carbonic oxide is composed of 12 parts of carbon and 16 parts of oxygen; carbonic acid of 12 parts of carbon and

32 parts of oxygen; water of 2 parts of hydrogen and 16 parts of oxygen; marsh gas of 12 parts of carbon and 4 parts of hydrogen; olefiant gas (ethylene) of 24 parts of carbon and 4 parts of hydrogen, etc. The combining weights of the three elements mentioned are, approximately: carbon, 12; hydrogen, 1; oxygen, 16; and it is easy to see that in stating the composition of our compounds we have been able to use either these numbers or simple multiples of them. Dalton was led to the discovery of this law by the hypothesis according to which all matter is made up of 'atoms'—i.e. of minute particles incapable of further subdivision. The atomic theory, based on this hypothesis, comprises the following assumptions: The atoms of any given element are identical; the atoms of different elements are different and have different weights; by the force of chemical affinity several atoms may be held in combination, forming a particle, or 'molecule,' of a compound, and very large numbers of molecules are necessary to make up even the smallest amounts of compounds which we are actually capable of handling. In accordance with these assumptions, let M stand for the number of molecules making up a certain amount of some compound containing two elements; and let the amount of the first element in it be a, the amount of the second element b. Let, further, A stand for the weight of a single atom of one of the elements, and n stand for the number of such atoms contained in a single molecule of the compound. Then, evidently, the weight a of the first element in the compound equals $M \times n \times A$. Similarly, if A' stand for the weight of a single atom of the second element, and n' for the number of its atoms contained in a single molecule of the compound, then, evidently, the total weight b of the second element in M molecules equals $M \times n' \times A'$. We therefore have

$$a : b :: MnA : Mn'A'$$

$$\text{or, } a : b :: nA : n'A'$$

In case a molecule of the compound should contain equal numbers of atoms of the two elements, then $n = n'$, and hence

$$a : b :: A : A'$$

But these proportions tell us that the weights (a and b) of the elements in a compound are proportional either to the weights of single atoms (A and A'), or to multiples (nA and $n'A'$) of those weights. Thus the fundamental law of chemical composition follows as a direct consequence from, and is, hence, completely explained by, the atomic hypothesis, without which it would be a mystery. The 'combining weights' mentioned above in connection with our statement of the law are seen, in the light of the hypothesis, to represent the relative weights of the atoms themselves, and are therefore termed *atomic weights*.

But while the fundamental assumptions of the atomic theory thus establish a general relation between the quantitative composition of substances and the relative weights of atoms, they do not furnish a sufficient basis for determining these relative weights in an unequivocal manner. When we apply the above proportions to some given substance—say, water—for the purpose of determining the atomic weights of its elements, we find ourselves compelled to make some additional assumption. Indeed, chemical analysis shows that water contains 11.1 per cent. of hydrogen and 88.9 per cent. of oxygen. We therefore have

$$a : b = 11.1 : 88.9 = 1 : 8 \text{ (nearly)}$$

and hence

$$nA : n'A' :: 1 : 8,$$

where A and A' are, respectively, the weights of single atoms of hydrogen and oxygen, while n and n' are, respectively, the numbers of atoms of these elements in a molecule of water. What we are after is the ratio $A : A'$—i.e. the relative weights of single atoms; but this we evidently cannot find unless we assign some numerical value to the ratio $n : n'$. Dalton assumed that a molecule of water is made up of one atom of hydrogen and one of oxygen—i.e. $n = n' = 1$, and therefore he found

$$A : A' :: 1 : 8,$$

i.e. an atom of oxygen is 8 times as heavy as an atom of hydrogen. (In reality, Dalton thus obtained, for the atomic weight of oxygen, the figure 6; but this was due to his imperfect knowledge of the proportion of hydrogen and oxygen in water).

Dalton's assumption was quite arbitrary. But in subsequent years, as the substances known grew numerous and complex, chemists began to feel the want of some general theoretical principle which would render arbitrary, and hence confusing, assumptions unnecessary. Then Gerhardt and Cannizzaro enriched Dalton's atomic theory by adding to it a principle which had been enunciated by Avogadro as early as 1811, but which had remained unemployed as long as it was not urgently needed. According to Avogadro, equal volumes of different gases contain equal numbers of molecules if the temperatures and pressures of the gases are the same. This theoretical principle, and its use in determining the atomic weights of the elements, have been explained at some length under ATOMIC WEIGHTS and AVOGADRO'S RULE (qq.v.), and require no further discussion here. Suffice it to state that it forms part of the very foundation of the present atomic and molecular theory, and that it is involved in the discussion of most, if not all, problems of modern chemistry.

A still further addition was made to the fundamental hypotheses of the atomic theory before it attained its maximum of possibilities. This last addition, gradually incorporated during the second half of the Nineteenth Century, consists of certain assumptions concerning the combining forces of atoms, the number of such forces peculiar to the atom of each element, and the directions in which those forces act. (See below, under *Chemical Formulas*; and see the articles VALENCY; CARBON COMPOUNDS; and STEREOCHEMISTRY.) These assumptions, forming the so-called 'doctrine of valency,' were adopted mainly because of the necessity of explaining the isomerism of organic compounds—i.e. the fact that quite different compounds may have exactly the same composition. And it was mainly when fortified by these assumptions that the atomic theory enabled us to know compounds before they have actually been found in nature or in a chemical laboratory.

"But," says Ostwald, "it seems as if the adaptability of the atomic hypothesis is near exhaustion, and it is well to realize that, according to the lesson repeatedly taught by the history of science, such an end is sooner or later inevitable." In the future, he believes, chemists will speak a language free from the atomic or any other hypothesis, and based on nothing but experimental observations.

CHEMICAL FORMULAS. In the notation based on the atomic theory, the atoms of the several elements and their relative weights are represented by symbols, such as H for hydrogen, O for oxygen, C for carbon, etc.; H standing for 1, O for 16, C for 12, etc. (A list of elements, with their symbols and atomic weights, may be found in the article ATOMIC WEIGHTS.) When two or more elements combine chemically, their atoms are assumed to become associated in groups (molecules) without being in any way changed. The assumption is based on the fact that the elements of a compound can be re-obtained from it in the free state, though we do not know, of course, what really becomes of an element when it combines with other elements; for, as we have seen above, chemical combination usually causes the properties of the elements to disappear more or less completely. In accordance with the assumption, the formula of a compound is made up from the symbols of its elements. For example, the formula of carbonic oxide is CO: that of carbonic acid is CO_2, etc.; C denoting one atom of carbon, O_2 two atoms of oxygen, etc. The formulas at present used by chemists are of three different kinds—viz. empirical, molecular, and graphic.

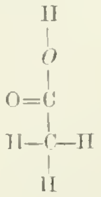
An *empirical formula*, as the name suggests, may be considered as involving no hypothesis whatever: it is merely the simplest form in which the composition of a compound may be expressed in terms of the atomic weights of its elements. For example, analysis shows that acetic acid contains 6 parts of carbon, 1 part of hydrogen, and 8 parts of oxygen; or—what is the same—12 parts of carbon, 2 of hydrogen, and 16 of oxygen. Using the symbol C to represent 12 parts of carbon, the symbol H 1 part of hydrogen, and the symbol O 16 parts of oxygen, we may denote the composition of acetic acid by the empirical formula CH_2O, which is nothing but a symbolic expression of the results of analysis.

But analysis also shows that certain other substances have the same composition as acetic acid; for example, the well-known formaldehyde. It is therefore clear that, in order to denote their compounds in a definite manner, chemists must employ formulas which express something else besides composition. Now, Avogadro's hypothesis leads to a knowledge of the relative weight of the molecule of a compound, that weight being, namely, twice as great as the vapor density of the compound referred to hydrogen. (See MOLECULES—MOLECULAR WEIGHTS.) So, to compare acetic acid and formaldehyde, we determine their vapor densities, and as the vapor of acetic acid is found to be 30 times as heavy as hydrogen, and formaldehyde vapor is found to be 15 times as heavy as hydrogen, we assign to the acid the 'molecular weight' 60, and to the aldehyde the 'molecular weight' 30. On the basis of this difference, we represent the two compounds, respectively, by the formulas $C_2H_4O_2$ and CH_2O, which have the total weights 60 and 30, while the relative weights of the constituent elements are obviously the same in both. Formulas like these, which denote not only the relative composition of substances, but also their molecular weights, are termed *molecular formulas*. In the case of formaldehyde, the molecular formula, CH_2O, happens to be identical with the empirical formula, CH_2O; in many other instances, however, this is not so. A thing exceedingly important to remember is, that *molecular formulas represent practically equal volumes of substances in the gaseous* (or dissolved) *state, under the same conditions of pressure and temperature.* See AVOGADRO'S RULE.

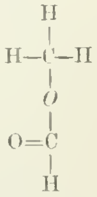
But even molecular formulas do not, in very many cases, suffice to characterize fully the compounds represented by them, for different compounds may have not only the same composition, but also the same molecular weight. Consider, for example, the ethereal salt formed by the action of formic acid on wood alcohol. This compound, called methyl formate or methyl-formic ester, has precisely the same composition as formaldehyde and acetic acid, and precisely the same vapor density as the latter. It must therefore be represented by the same molecular formula as acetic acid:

$C_2H_4O_2$	$C_2H_4O_2$
Acetic acid	Methyl formate

To differentiate compounds like these, chemists use *graphic* or *structural formulas*. Such formulas represent compounds as different because the atoms are differently combined within their molecules, though the kind and number of atoms are the same. To exhibit these differences of combination, chemists employ the assumptions of the doctrine of valency. They assume an atom of hydrogen to be always 'uni-valent,' because as a rule it is incapable of holding in combination more than a single atom of another element; they assume an atom of carbon to be 'quadri-valent' because in marsh gas, CH_4, they find it combined with *four* atoms of hydrogen, and for other reasons of the same nature; and they assume an atom of oxygen to be 'di-valent' because in water, H_2O, they find it combined with *two* atoms of hydrogen. With the aid of these assumptions, symbolized by dashes ('bonds') linking together the atoms, they represent acetic acid and methyl formate, respectively, by the following graphic formulas:



Acetic acid



Methyl formate

The differences between the two formulas are obvious; thus, the formula of methyl formate shows one of its oxygen atoms as linking together two carbon atoms, while in the formula of acetic acid the corresponding oxygen atom links a carbon atom to an atom of hydrogen. An explanation of the principles used in determining which of all graphic formulas possible in a given case should be assigned to the compound under consideration may be found in the article CARBON COMPOUNDS. To determine the 'chemical constitution' of a compound means to determine its graphic formula; for the latter corresponds with, and is therefore a simple expression of, its most important chemical properties.

Graphic formulas often have an abbreviated form: the dashes are omitted, the atoms are combined into groups, and these are written so that their relative arrangement in the molecule may be evident. Such abbreviated expressions are usually employed, for convenience' sake, in preference to the full graphic formulas. Thus, acetic acid is represented by the formula $CH_3.CO.OH$ (or simply CH_3COOH, or CH_3CO_2H); methyl formate is represented by the formula $H.CO.OCH_3$; etc. Remembering the valencies peculiar to the constituent elements, the chemist has no difficulty in reconstructing the graphic formulas from abbreviations of this kind. There is, however, another kind of constitutional formulas, which may be described as incomplete, or imperfect, because they are made up of atomic groups which can be represented, not by only one, but by two or more different graphical schemes. Such formulas are assigned to compounds when we do not know enough about their chemical nature.

Mixtures. We have seen in a preceding paragraph that while the properties of a chemical compound are quite different from those of its constituent elements, the properties of a mixture are made up by the alligation of those of the components. This is true in the case of all gaseous mixtures, and one of the general laws of gases is that the pressure in a vessel containing several gases is equal to the sum of the pressures that would be exerted by them if each was isolated in a similar vessel (Dalton's law). But in the case of homogeneous ('physical') mixtures in the solid or liquid state, the principle of the 'additivity of properties' is only a rough approximation, for in such mixtures the properties of each component are often considerably affected by the presence of the other components. A class of mixtures whose theory forms one of the most important chapters of physical chemistry will be discussed in the article Solution.

TRANSFORMATIONS.

We have seen above that when heat is applied to a mixture of hydrogen and oxygen, or to a mixture of powdered iron and sulphur, changes set in which result in the formation of entirely new substances—water and sulphide of iron respectively. Changes of this kind are termed *chemical reactions.* On the other hand, there are changes of matter that are much less profound in their character and involve neither the disappearance of the given nor the formation of new chemical substances. Such changes (mostly changes of state) are termed physical transformations. Thus, for example, the mere evaporation of water may be spoken of as a physical transformation, because liquid water and water vapor are chemically identical. The science of chemistry deals with physical as well as with chemical transformations, mainly because the former often influence and accompany the latter. Following are the laws governing the various transformations of matter:

(1) Conservation of Mass. No transformation is known to involve gain or loss of the mass of matter. When, for example, a candle burns up in the air, its material is not lost; it merely combines with the oxygen of the air to form two invisible products—water vapor and carbonic acid; but these, too, are matter, for they have weight, and their mass is precisely equal to the original mass of the candle, *plus* the mass of oxygen consumed. Hence the inductive principle known as the law of the indestructibility or conservation of mass. A strong argument in favor of this law is found in the fact that in spite of the violent processes undoubtedly taking place in the sun, its weight has not in the least changed within historical times: for an appreciable change in the mass of the sun would have involved a change in the length of the day, and such a change is positively known not to have taken place. Of course, the main evidence in favor of the principle of conservation is presented by the innumerable quantitative processes actually employed by chemists. Besides, accurate investigations have been instituted for the special purpose of testing the precision of the principle, and have invariably failed to prove it incorrect.

(2) Conservation of the Elements. No transformation is known to involve the transmutation of one chemical element into another. Combining this with the preceding principle, we get what is known as the law of conservation of the elements. According to this, no transformation involves gain or loss of the mass of each of the chemical elements, and hence, while an element may exist either free or in a state of chemical combination with other elements, its total mass in the universe is unchangeable.

(3) Combining Quantities. While we can mix substances in any desired proportion, chemical combination can only take place between certain definite relative quantities, which depend on the nature of the reacting substances. Thus, hydrogen and oxygen combine in the proportion of 1 part by weight of the former to 8 parts by weight of the latter; or, what is the same, they combine entirely when the volume of hydrogen is twice as great as the volume of oxygen (oxygen is 16 times as heavy as hydrogen). If, instead of these relative quantities, we should mix, say, 1 part by weight of hydrogen with 9 parts of oxygen, we would still find that only 8 parts of the latter have combined with all of the hydrogen into water, and that 1 part of oxygen has remained uncombined: the case would be analogous if, instead of an excess of oxygen, we employed an excess of hydrogen. Hence, the conception of 'combining quantities.' Early in the Nineteenth Century, Gay Lussac discovered a remarkable fact—viz. that the relative combining volumes of gases can in all cases be expressed in the form of simple arithmetical ratios. We have just seen that hydrogen and oxygen combine in the ratio of 2 volumes of the former to 1 of the latter (the product is 2 volumes of water). In the case of the reacting pair, hydrogen and chlorine, the ratio is still simpler, 1 volume of hydrogen combining with 1 volume of chlorine (the product is 2 volumes of hydrochloric acid). It was this general fact that suggested to Avogadro his celebrated hypothesis, in accordance with which we explain the fact that 2 volumes of hydrogen react with 1 of oxygen, by saying that every 2 *molecules* of the former react with every 1 *molecule* of the latter.

Chemical Equations. The three principles just stated are expressed symbolically in those equations which chemists use to represent the various reactions of substances. Take, for example, the equation representing the combustion of marsh gas—that is, its combination with oxygen—viz.:

$$CH_4 + 2O_2 = CO_2 + 2H_2O$$

The symbols CH_4, $2O_2$, CO_2, and $2H_2O$, represent, respectively, certain relative weights of marsh gas, oxygen, carbonic acid, and water; and the sign of equality denotes that the total mass of the carbonic acid and water yielded is precisely the same as the total mass of the marsh gas and oxygen that have disappeared as such. Similarly, the fact that the total number of C's, H's, and O's is respectively equal in the two members of the equation reminds us of the principle of conservation of the elements. Further, CH_4, O_2, CO_2, and H_2O represent equal volumes of the four substances, and hence the equation expresses that 2 volumes of oxygen are required to burn completely 1 volume of marsh gas, and that the products of the combustion are a volume of carbonic acid equal to that of the marsh gas burned and twice that volume of water vapor.

Reversible Reactions. In mathematics, the members of an equation can always be transposed at pleasure, and $a = b$ may as well be written $b = a$. Not so in chemistry. A chemical equation represents not merely an equality of quantities, but an actual reaction of substances. And if, for example, marsh gas and oxygen react to form carbonic acid and water, it does not by any means follow that carbonic acid and water will react to form marsh gas and oxygen, which would be expressed by the above equation if written in the form

$$CO_2 + 2H_2O = CH_4 + 2O_2$$

There are, however, reactions that can actually be reversed. For instance, ordinary ethyl alcohol and acetic acid react to form ethyl-acetic ester and water. But ethyl-acetic ester and water also react to form ethyl alcohol and acetic acid. In this case we are, of course, justified in writing the equation in either of the following forms:

$$\underset{\text{Alcohol}}{C_2H_5OH} + \underset{\text{Acetic acid}}{CH_3CO_2H} = \underset{\text{Ester}}{CH_3CO_2C_2H_5} + \underset{\text{Water}}{H_2O}$$

$$\underset{\text{Ester}}{CH_3CO_2C_2H_5} + \underset{\text{Water}}{H_2O} = \underset{\text{Alcohol}}{C_2H_5OH} + \underset{\text{Acetic acid}}{CH_3CO_2H}$$

Reactions of this nature are termed *reversible reactions*, and are now denoted by expressions in which the sign of equality is replaced by two arrows pointing in opposite directions. Thus, the reactions just mentioned would be represented as follows:

$$\underset{\text{Alcohol}}{C_2H_5OH} + \underset{\text{Acetic acid}}{CH_3CO_2H} \rightleftarrows \underset{\text{Ester}}{CH_3CO_2C_2H_5} + \underset{\text{Water}}{H_2O}$$

The investigation of reversible reactions has resulted in the establishment of the so-called law of mass action, which is at the basis of modern chemical statics and dynamics. This will be discussed at some length in the article Reaction.

Thermochemical Equations. Every given quantity of matter carries with it a certain quantity of energy. Heat being a form of energy, it is clear that the hotter the body the greater its energy. To cool it, we must abstract some of its heat by bringing it into contact with some cooler body; and then, by determining the rise of temperature in the latter, we can learn how much energy the hot body has lost. But while we can thus readily find out how much more energy a body contains at one temperature than at another, we have no way of telling how much energy it contains altogether, for we have no way of abstracting its energy entirely. Nevertheless, we know that different substances generally contain different amounts of energy, even if their temperatures are precisely the same. This is plainly shown by the fact that different substances have different 'specific heats'—that is to say, that different amounts of heat are required to cause an equal rise of temperature in equal masses of them.

Now, since during chemical reactions the given substances disappear as such and new ones arise in their place, it is evident that chemical reactions must be accompanied by either evolution or absorption of heat. For, like the mass of matter, a quantity of energy can be neither destroyed nor created out of nothing, by a chemical or any other transformation. If the original reacting substances contain more energy than the products of the reaction, the reaction will cause some energy to be given off; thus, hydrogen gas and oxygen gas contain much more energy than the water vapor that may be formed from them, and hence their combination (the 'burning') sets free much energy in the form of sensible heat. Precisely the same amount of energy would, on the contrary, be taken up if water were decomposed into its elements, hydrogen and oxygen. Reactions in which energy is given off are called *exothermal reactions;* those in which energy is taken up are called *endothermal reactions.* It must not be thought, however, that transfers of energy are involved in chemical reactions alone. Thus, the evaporation of water is a purely physical transformation, and yet it involves the absorption of much heat. For this reason, if a chemist wishes to ascertain how much energy has been given off or taken up in a given chemical reaction, he must make a thorough study of the physical changes accompanying the reaction and of the transfers of energy caused by those changes. In this respect the most important form of physical change is the dissolution of solids in liquids, especially in water, because many important reactions take place in aqueous solutions.

The above considerations make it evident that the chemical equations discussed in preceding paragraphs are really incomplete; for they represent transformations of matter without stating what changes of energy accompany them. Whenever, therefore, questions of energy are of moment, whether in theoretical discussions or in problems dealing with foods, fuels, etc., chemists use a more complete form of equations—viz. 'thermochemical equations.' In writing these, Ostwald has adopted the following notation: Gases are denoted by their chemical formulas inclosed in parentheses; solids by their formulas inclosed in brackets; liquids simply by their formulas; substances dissolved in a great deal of water by the symbol Aq (i.e. *aqua*, water) affixed to their chemical formula's. Thus, (H_2O) denotes water vapor; $[H_2O]$ denotes ice; H_2O denotes liquid water; KClAq denotes potassium chloride in very dilute aqueous solution. Ostwald also proposes to denote the energy taken up or given off during reactions in terms of *kilojoules*, denoted by the symbol J. One kilojoule (= 10000000000 ergs) is the same as 239.1 calories, a calorie being here the amount of heat required to raise by 1° C. the temperature of one gram of water of 18° C. For example, the neutralization of hydrochloric acid by potash in dilute solution, which is ordinarily represented by the equation

$$HCl + KOH = KCl + H_2O,$$

would be denoted thermochemically in the following form:

$$HClAq + KOHAq = KClAq + 57.3J.$$

In this manner the thermochemical notation gives brief, complete, and precise expression to all the important facts connected with the transformations of matter. The number of kilojoules represents the total amount of energy given off or taken up, whether all that energy is in the form of heat, or part of it is in the form of mechanical work, light, or electricity.

HISTORY.

Ancient History. The history of ancient philosophy records certain theories of matter, which have had a directing influence on chemical thought during later centuries. The most important ideas date from the Fifth Century B.C. Empedocles (c.490-30 B.C.), who may have derived his views from the ancient philosophers of the East, held that air, water, earth, and fire are four elements unrelated to one another and forming the basis of the universe. Aristotle (B.C. 384-22) added a fifth element, *ousia* (*οὐσία*), a purely spiritual substance pervading the infinity of space. During the Middle Ages not a little energy was lost in researches after this 'fifth essence,' which, by confusion of ideas, came to be regarded as a fifth elementary form of matter. To Aristotle the material elements were not altogether different from one another, but were forms of a primary substance differentiated by properties—as dry, moist, hot, cold—that were not essential to its nature. Hence, later, the alchemists' attempts to turn metals into one another, crowned by the belief that such transmutations cannot be effected by any known means. The atomic conception dates from Democritus (c.460-370 B.C.), who held that all bodies are made up of the atoms of one and the same substance, and that the differences exhibited by the various forms of matter are due entirely to differences in the size and shape of their atoms. It is hardly necessary to state that if this undeveloped idea of Democritus had not furnished a suggestion that led to the building up of a useful chemical doctrine, it would deserve no mention in the history of science. It is thus clear that the ancients did nothing directly toward the building up of a science of chemistry. Indeed, how much chemical knowledge can we expect to find in an age when a man like Aristotle did not hesitate to assert that a vessel will hold as much water if filled with ashes as when empty?

However, the ancients knew some facts and processes which lie within the scope of modern chemistry. Most of that knowledge was gained empirically by the Egyptians, and was by them communicated to the Jews and Phœnicians, and later to the Greeks and Romans. The metallurgy of gold, silver, copper, iron, lead, tin, mercury, and perhaps zinc, and the preparation of certain alloys, were known at quite an early date. The Egyptians had highly developed the art of making glass and of coloring it by means of certain metallic oxides, and many extant specimens of Egyptian pottery are beautifully enameled in various colors. The art of dyeing fabrics with the aid of mordants had likewise been developed at an early date, and many mineral and organic coloring matters were known to the Egyptians, Phœnicians, and Jews. The Egyptians were also probably the first to employ substances for medicinal purposes.

Alchemy. Egypt was the birthplace of alchemy, the pretended art of making gold and silver from base metals. Based on superficial observation and the erroneous interpretation of phenomena, this pseudo-art subsequently absorbed the attention of men for many centuries (see Alchemy), and rendered scientific progress, and hence the development of the useful arts, impossible. Thus, the arts of metallurgy and of dyeing remained through the Middle Ages practically what they had been in Egypt long before the beginning of our era. Nevertheless, in their fantastic search after the philosopher's stone, the alchemists discovered methods of preparing many new substances, perfected many processes of manipulation, and thus slowly paved the way for the future investigator. Bismuth and antimony, sulphuric, hydrochloric, and nitric acids, the chloride and the carbonate of ammonium, the nitrates of potassium and silver, compounds of mercury, antimony, and arsenic—these and many other important substances were first prepared and their properties were first studied by the alchemists. Of course, the interpretation of known facts was absurd, based as it often was on the most groundless assumptions—for instance, the assumption that most substances and certainly all metals contain sulphur. As to the compounds of carbon, the alchemists did hardly anything toward laying a foundation for future organic chemistry, although they learned to concentrate aqueous acetic acid by distillation and to prepare a few metallic acetates, and were familiar with certain reactions, such as the transformation of ordinary alcohol under the influence of sulphuric acid, the formation of certain esters, etc. A number of substances derived from the organic world were also used for medicinal purposes; but it was not until the beginning of the 'iatrochemical' period that the art of preparing substances began to be looked upon as a handmaid of medicine. Alchemy proper had only one great object in view—to ennoble the base metals and to prolong life indefinitely—and this remained the principal aim of some of the best men even to the close of the era of iatrochemistry, and even the scientific achievements of more recent times have not sufficed to banish the fancy completely.

Iatrochemistry (Gk. *ἰατρός*, *iatros*, physician). The first great iatrochemist was Paracelsus (1493-1541), who taught that the aim of chemistry was the preparation, not of gold, but of therapeutic agents. Adopting a view current among alchemists prior to his time, he held that, everything being composed of sulphur, mercury, and salt, if the amount of any of these happens to rise above or fall below the normal in the animal body, the result is a condition of disease. Hence, disease must be combated by chemical means. Paracelsus therefore devoted himself to pharmacy and medical chemistry, and soon became famous through the many happy cures that he actually succeeded in effecting. Unfortunately the adventurous life that he led, and his gross lack of modesty, aroused suspicion in many, and the bitterest opposition among the more conservative members of the medical profession, and obscured his fame and greatly diminished the sphere of his influence. Nevertheless, his great work was accomplished; pure alchemy had received at his hands the first powerful blow, pharmacy had been firmly linked to chemical science, and medicine had been aroused from the torpor of many centuries.

Following in the steps of Paracelsus came Turquet de Mayerne (1573-1655), Andreas Libavius (?-1616), Oswald Croll, Adrian van Mynsicht, and the great Van Helmont (1577-1644). Van Helmont not only realized that the processes of life, in health and disease, are largely dependent upon chemical changes, but he abandoned the arbitrary assumptions of Paracelsus concerning the chemical basis of the animal body, and his keen experimental researches imparted a powerful impulse to the development of scientific medicine. Equally, if not more, important was his recognition of the fact that there may be other gases than air, and that atmospheric air, carbonic acid, hydrogen, marsh gas, and sulphurous acid may be quite different from one another. In certain special cases he also succeeded in showing that substances are not lost, either qualitatively or quantitatively, when they enter into chemical combination, and that they may be reobtained entirely from the resulting compounds. Yet he believed in the possibility of making gold, and among the absurdities found in his writings is the assertion—strange to relate—that mice may be spontaneously produced in buckets filled with soiled linen and wheat flour! But if the spirit of the time permitted such beliefs, so much more wonderful must appear the scientific penetration of his genius, so much more deserved is his place among the best names of both chemistry and medicine. Other important names in connection with iatrochemistry are those of Sylvius (1614-72) and Tachenius. Sylvius was the first to grasp the similarity between the processes of respiration and combustion, and, recognizing the distinction between arterial and venous blood, he understood that the bright color of the former was due to the action of air. Digestion, too, he considered as a purely chemical process. His pupil, Tachenius, was the first clearly to recognize that salts are substances formed by the union of acids and bases; he studied the composition and properties of many substances, invented a number of interesting qualitative tests, and even subjected a few reactions to quantitative investigation, determining, for instance, the gain of weight involved in the oxidation of lead.

The age of iatrochemistry marks a great period in chemical history. During this period, for the first time, we find many thoughtful men making an endeavor to free themselves from the preconceived ideas of the past, and to approach nature in a critical spirit and with a curiosity purely scientific. With iatrochemistry was thus born the possibility of chemical progress. But this is not the only thing for which mankind is indebted to that period. For, while the iatrochemists were preparing the first material for the very foundation of future chemistry, others were busy developing industries which have since become affiliated to our science. Foremost among these men were Agricola, Palissy, and Glauber. Georg Agricola (1490-1555) rendered great services to mining and metallurgy, introducing rational scientific methods into the former and perfecting many of the processes of the latter. His splendid treatise on metallurgy, in which these processes were described for the first time, long remained the standard work on its subject. Besides, he introduced a practical system for the classification of minerals, based on their physical properties, such as color, hardness, etc. Bernhard Palissy (c.1510-89), considering worthless and ridiculous the efforts of alchemy, devoted himself to experimental research in ceramic art, and invented a number of valuable methods of coloring and enameling articles of pottery. Johann Rudolf Glauber (1604-68) improved many processes of dyeing, and prepared a number of useful salts, including sodium sulphate ('Glauber's salt'), the chlorides of zinc, tin, arsenic, copper, lead, and iron, the nitrate of ammonium, tartar emetic, etc. He even succeeded in gaining some insight into the *rationale* of certain processes: but this did not prevent him from adhering to the most fantastic absurdities of alchemy to the very end of his life. In connection with the iatrochemical period, reference must finally be made to the wonderful development of the art of making articles of glass, and to the rapid progress of the liquor industry, which had only been founded toward the end of the Fifteenth Century—i.e. a short time before the commencement of the period. As to scientific pharmacy, we have already stated that its beginning coincides with that of iatrochemistry, and it is hardly necessary to add that the latter enriched it with many new preparations, and with a knowledge of the medicinal properties of substances already known.

About the middle of the Seventeenth Century, iatrochemistry came to a sudden decline. That this had to happen sooner or later is clear, if we consider that a true medical chemistry could not possibly flourish before, on the one hand, chemistry itself was placed on a sound basis, and before, on the other hand, anatomy and physiology had attained a stage of serious development. The iatrochemists had evidently misdirected their efforts, and if we should in our present structure of chemistry mark the parts established by them, we would find that their lasting contributions were very few. The historical importance of the period is chiefly in the fact that with it came a revolution against traditional errors and a change in the direction of research.

THE FORERUNNERS OF CHEMISTRY. In the Seventeenth Century we find the Englishman Robert Boyle (1627-91) grasping truth with an insight unprecedented, and in many respects not yet surpassed. Boyle understood that chemistry must be treated as an independent science—i.e. primarily without reference to applications of any sort, and that only in this manner could the relationships between chemical phenomena proper be discovered. He maintained that chemists should consider as an element only a substance which, in spite of exhaustive actual efforts, they have not succeeded in decomposing. And even this method, though necessary and sufficient for the purposes of science, he did not regard as proving the elementary nature of a substance absolutely beyond doubt. Still, he was inclined to consider the metals as elements, and, proving experimentally that the products of the destructive distillation of wood are compound, he refuted the opinion—then generally prevalent—that dry distillation breaks up substances into their elements. He further defined the distinction between a chemical compound and a mixture: the properties of a chemical compound, he maintained, are quite different from those of its components, while in a mixture each constituent retains its characteristic properties practically unaffected. Above all, he earnestly warned chemists against adopting hypotheses and general theories *a priori*. Theories are necessary; but unless they are generalizations cautiously made from observed facts, they may be dangerously misleading.

Boyle's views are now accepted universally. Had he grasped and succeeded in spreading abroad one more idea—viz. the absolute necessity of quantitative investigation—he would have doubtless become the founder of the science of chemistry—that is to say, with him would have commenced the epoch enlightened by truth and free from fundamental errors. This he did not accomplish; nor was it possible to accomplish it before the characteristics of gaseous matter came to be known better than they were in his day. And so it came about that chemists failed to appreciate his great warning against hypotheses that are not rigidly correlated with facts, adopted a belief in a fiery 'phlogiston,' and thus created a period of darkness that lasted a century. It must be remembered that the important phenomena of what we now call oxidation engaged the attention of chemists toward the end of the Seventeenth Century and through the entire Eighteenth Century. These phenomena were explained by the supposed existence of phlogiston, a substance which may have been first produced in the erring mind of some alchemist, but the first clear reference to which, under the name of *terra pinguis*, we find in the works of Becher (1635-82). Stahl (1660-1734) named it phlogiston, endowed it with certain imaginary properties, and used it as the basis of a doctrine which was soon accepted throughout the civilized world.

To give a clear and precise account of this, as of any other erroneous doctrine, is a matter of considerable difficulty. For when ingenious men are dominated by error, they usually mold it into a variety of forms in their efforts to give it the appearance of truth and render it consistent with itself. The phlogistians handled their hypothesis with much dexterity. Yet their thought, lacking the character of quantitative precision, was weak; for quantitative conceptions, while already mastered by the physicist, were still in a state of confusion in the mind of the chemist. Distinguishing clearly between the absolute weight of bodies and their specific gravity, we have no difficulty in understanding that although water vapor is lighter than air, its addition to a given body must increase the weight of the latter, because water, whether liquid or vaporized, has weight. Stahl believed that the conversion of a 'calx'—i.e. a metallic oxide—into metal was caused by the addition of phlogiston. He knew that the conversion was accompanied by a diminution of weight; but from this fact he only deduced that phlogiston must be 'lighter than air,' failing to grasp that such an addition may make a body *lighter* in the sense of producing a system of lower specific gravity, but must necessarily make it *heavier* in the sense of increasing its absolute weight. It is more probable, however, that Stahl understood this in a general way, but thought that the metals had a lower specific gravity than their calces. At least, Juncker, a pupil of Stahl's, asserts this about metals and calces as a matter of fact, although Boyle had long since shown experimentally that the specific gravity of metals is really higher than that of their calces. Much more extraordinary is the conception that we find in the writings of Guyton de Morveau, Macquer, and others, who taught that phlogiston had *less than no weight!* Stahl conceived of phlogiston as a fiery principle, '*materia aut principium ignis, non ipse ignis*.' Seeing that charcoal burns up completely, and is capable of producing metals by adding itself, as he thought, to their calces, he considered charcoal as made up almost entirely of phlogiston. Cavendish, knowing that 'inflammable air' is given off when metals are dissolved in acids, adopted the view that that inflammable air (hydrogen) was phlogiston, with which metals part on coming into contact with acids. An inconvenient fact in connection with the phlogistic theory was that combustion, including the transformation of metals into calces, could only take place in the air. Stahl and his followers referred to this fact as if it were quite natural that if phlogiston was to be absorbed from metals there must be a medium capable of absorbing it. There were thoughtful men, however, who would not be satisfied with explanations of this kind. Boerhaave, whose *Elementa Chemiæ* (1732) served for many years as the standard text-book of chemistry, taught distinctly that the conversion of metals into calces involved the absorption of something from the air. This he deduced by combining the fact that the presence of air was necessary with the fact that the conversion involved increase in weight. The latter fact he even freed from an erroneous explanation attached to it by Boyle, who had thought that the increase in weight was due to absorption of heat during calcination; by the use of the balance Boerhaave showed that metals have precisely the same weight when glowing hot as when cold, and thus proved that heat has no weight. So near the truth were some. Yet none rose to combat the phlogistic theory, and all—even Boerhaave—were dominated by it more or less.

Two things were necessary to make away with phlogiston: First, a clear knowledge of some of the ordinary gases; secondly, a clear quantitative knowledge of some of the ordinary chemical transformations. The gases in question are carbonic acid, oxygen, and air. As to quantitative chemical knowledge, it can, of course, be acquired only by the use of the balance. Carbonic acid was known since the time of Van Helmont; yet chemists were not sure but that it might be impure air, until Joseph Black isolated it and demonstrated its properties in 1755. Bergman completed the study of this gas in 1774. The presence and properties of oxygen were suspected by Boyle, Mayow (1669), Boerhaave, and others; but it was first actually isolated by Priestley and Scheele in 1774. The nitrogen of the air was isolated by Rutherford in 1772. It must be remarked here that the apparatus and manipulations of 'pneumatic chemistry' were gradually perfected by Boyle, Hales, Moitrel d'Élément, Black, and Priestley, the latter having invented the method of collecting gases over mercury, which rendered possible the isolation of gases that are soluble in water. But the precise demonstration of the composition of gases, the introduction of the systematic use of the balance, are due to the founder of quantitative chemistry—the French physicist and chemist Lavoisier.

But before we proceed to narrate the further progress of chemical philosophy, it remains to enumerate briefly the most important achievements of chemical technology during the reign of phlogiston. In spite of its fundamental error, chemistry was making fairly rapid progress, and this naturally told on the industries. Boyle and Kunkel improved many metallurgical processes and the manufacture of glass. The manufacture of iron and steel owed valuable improvements to the researches of Bergman, Gahn, Rinman, and Réaumur. Stahl, Scheele, Hellot, Macquer, and others introduced new dyestuffs and improved many processes of dyeing. The preparation of zinc was improved by Marggraff, and its manufacture on a large scale was commenced at Bristol in 1743. The manufacture of sulphuric acid was commenced by Ward at Richmond; and in 1746 lead chambers were first introduced by Roebuck. In 1747 Marggraff discovered sugar in beets; however, the sugar industry was not born until the beginning of the Nineteenth Century. Early in the Eighteenth Century (1703) Böttger was accidentally led to the invention of porcelain, and its manufacture commenced at Meissen in 1710; but the processes were kept secret, and the manufacture was confined to Meissen until Réaumur rediscovered them by systematic research, and finally, in 1769, great porcelain works were established also at Sèvres, near Paris. In the course of the period many substances were introduced as therapeutic agents, and Scheele discovered a number of important compounds of carbon.

Modern Chemistry. If, after we have become accustomed to think of modern chemistry as founded in the latter part of the Eighteenth Century, we take up the writings of phlogistic chemists prior to that time, we may be greatly surprised to find that our general principles were not at all unknown to them. They certainly believed in the indestructibility of matter, and some of them described molecules and atoms in much the same way as we describe them at the present day. And yet their knowledge cannot be rightly considered as constituting a science. Their abstract speculations were very keen: their knowledge of chemical facts was quite extensive; but that mathematical correspondence between abstract principles and concrete phenomena which alone constitutes science did not exist. And so, even when the properties of gases were no longer unknown, all chemical knowledge remained in a state of confusion, and elements continued to be considered as compounds, compounds as elements, combinations as decompositions, and decompositions as combinations, until the work of establishing the scientific correspondence was begun by Lavoisier.

Endowed by nature with a keenly critical mind, Lavoisier acquired the habit of quantitative thinking by early training in mathematics and physics, and by subsequent association with some of the most brilliant mathematicians and physicists of his time. As early as 1770 we find him solving a problem of chemistry by a purely quantitative method. It was known, namely, that when water is kept boiling for some time in a glass vessel, there is formed in it an earthy deposit; it was therefore believed that water could be converted into 'earth.' Lavoisier heated water in a glass vessel, weighed the vessel before and after the operation, and found that the vessel *plus* the deposit after the operation weighed exactly as much as the vessel alone weighed before. He thus proved that the earthy deposit came, not from the water, but from the glass of the vessel. In 1772 he turned the same quantitative method of experimenting and reasoning to the conversion of metals into calces, and in 1774 published the following observation: When metallic tin is heated in a sealed retort full of air, it becomes transformed into its calx; the weight of the sealed retort with its contents is exactly the same after the reaction as before; if the retort is now opened, air rushes into it and the weight is increased; the increase is equal to the difference in weight between the calx formed and the mass of metallic tin employed. From this Lavoisier concluded that the transformation of tin into its calx involved the absorption of air, and that phlogiston had nothing to do with the phenomenon. It also became evident to him that the balance of precision could serve the chemist no less than the telescope served the astronomer, and that the principle of indestructibility, which could and should be established experimentally, ought to be at the basis of all chemical reasoning. When Priestley and Scheele discovered oxygen, they thought that it was this constituent of air that was capable of absorbing phlogiston from metals; Lavoisier demonstrated that it was this constituent of air that combined with metals to form calces. He recognized that the same gas combined with sulphur, phosphorus, charcoal, and other combustible substances, and as he regarded the resulting compounds as acids, he gave to the gas the name *oxygen* (from the Greek ὀξύς, *oxys*, acid, and γενής, *genēs*, producing), and adopted the view that it was an indispensable constituent of all acids (this view was discarded half a century later). Carbonic acid he recognized as a compound of carbon and oxygen, and when Cavendish found that the sole product of the combustion of hydrogen in oxygen was water, Lavoisier understood that water was not an element, but a compound of hydrogen and oxygen, and had no difficulty in determining its quantitative composition. Carbonic acid and water he also showed to be the products of the combustion of organic substances, and soon he recognized that respiration, too, was a process of organic combustion.

Logical and consistent as Lavoisier's method appears to the unprejudiced mind, it failed to appeal to some of the most eminent men of his time. Thoroughly accustomed to the inverted principles of the phlogistic doctrine, those men adhered to them as firmly as fanatics will adhere to an absurd creed, and some of them, including Priestley, himself the discoverer of oxygen, died believers in phlogiston. Nevertheless, Lavoisier lived to see the light of his system spread over the entire scientific world, and turn chaos into order. He had established a rigid correspondence between the law of indestructibility and chemical transformations, and had thus built the first bridge between an abstract principle and the world of chemical phenomena. The concept *element* was now correctly applied to oxygen, hydrogen, carbon, sulphur, phosphorus, and the metals then known in the free state; the concept *compound* was correctly applied to water and the oxides of the metals. True enough, in his list of elements (1787) Lavoisier included also light and heat and the compounds potash, soda, and lime; on the other hand, he considered the element chlorine as a compound containing oxygen. But this did not interfere with further progress. The first bridge of chemistry was firmly established, and the lingering errors were rectified (mainly by Sir Humphry Davy) early in the Nineteenth Century. The development of another correspondence—viz. that between the hypothesis of the atomic constitution of matter and the quantitative composition of substances—was already noted in a preceding section of this article. Here it may be observed that the law of multiple proportions was first discovered by Richter (1762-1807), and that Proust (1754-1826) continued Richter's researches and clearly demonstrated the law in course of a controversy with Berthollet. Dalton (1804) re-discovered the law deductively and then proved it experimentally; he was thus the first to establish a rational connection between the old atomic hypothesis and the facts of chemical composition.

After the relation between the known metals and their oxides was established, Lavoisier himself, and others, began to suspect the true nature even of oxides whose metals were not yet known in the free state, and attempts began to be made to decompose these oxides so as to isolate their metallic elements. About the beginning of the Nineteenth Century, Sir Humphry Davy (1778-1829) undertook to investigate the effect of the galvanic current on chemical compounds. In 1807-08 he succeeded in decomposing caustic potash and caustic soda, obtaining from them the metals potassium and sodium. About the same time Seebeck similarly decomposed the oxides of calcium, barium, strontium, and magnesium, obtaining these metals in the form of their amalgams—i.e. combinations with mercury. From these amalgams Davy isolated the metals themselves and gave them their present names. From the metals Davy turned his genius to the non-metallic elements. Chlorine, known since 1774, remained unrecognized as an element, and was generally considered as the oxide of hydrochloric acid. In 1811 Davy clearly demonstrated its elementary nature; and when, soon afterwards, Courtois discovered iodine, Davy showed that this substance, too, so similar to chlorine, must be considered as an element. Davy also was the first to demonstrate clearly the elementary nature of nitrogen, and even of fluorine (from the similarity of hydrofluoric to hydrochloric acid, and of the fluorides to the chlorides), although the latter element was not yet known in the free state, and remained unknown until 1887. The value of Davy's contributions can be readily appreciated if we remember that the substances he was dealing with are among the commonest in the entire range of chemistry, and if we imagine how much confusion would suddenly ensue in all departments of the science if we were to forget their existence or their true nature.

DUALISM. On the basis of his electrolytic investigations, Davy also constructed an electrochemical theory which was subsequently modified and extended by Berzelius. According to Davy (1807), when the atoms of different elements come into contact, they become charged with the opposite forms of electricity, by whose attractive force they are held together, constituting chemical compounds. Berzelius's theory was as follows: The atom of each element does not *become* charged with electricity on coming in contact with other atoms, but *is* charged, whether combined with other atoms or not. With respect to the electrical charges of their atoms, the elements form an 'electro-chemical order,' oxygen being the most electro-negative, potassium the most electro-positive, and hydrogen dividing the electro-negative from the electro-positive elements. All bases are produced by the combination of oxygen with electro-positive, all acids by the combination of oxygen with electro-negative elements. Yet bases and acids are not altogether neutral; in the former positive electricity, in the latter negative electricity, predominates. This is why bases and acids show no mutual chemical indifference, but combine to form salts. When the terminals of a sufficiently powerful galvanic battery are immersed in the solution of a salt, the base of the latter is attracted more strongly by the negative terminal than by the acid, and the acid is attracted more strongly by the positive terminal than by the base; hence electrolysis ensues, the base being deposited on the negative, the acid on the positive, terminal. In brief, Berzelius maintained (1) that oxygen is an indispensable constituent of bases, acids, and salts; (2) that bases, acids, and salts have a dual constitution, each being made up of an electro-positive and an electro-negative part; (3) that chemical affinity is nothing but the mutual attraction of opposite forms of electricity. In the first of these principles Berzelius followed Lavoisier, for years refusing to accept Davy's view that chlorine and nitrogen were elements, and that their compounds with hydrogen — namely, hydrochloric acid and ammonia — although respectively an acid and a base, contained no oxygen. The structure of the entire theory became somewhat shaky when the correctness of Davy's views was finally recognized by all, including Berzelius himself (1820). Nevertheless, Berzelius, and with him the entire chemical world, continued to adhere to the electro-chemical theory, and thus a strictly dualistic conception of compounds continued to reign in the science. The thirties, however, brought much new evidence against Berzelius's principles. First of all it was recognized that electrolysis breaks up a salt, primarily not into two oxides, but into a free metal and an acid radicle. For example, potassium sulphate is broken up, primarily not into K_2O and SO_3, but into K_2 and the radicle SO_4. This made it evident that sulphuric acid was not SO_3, but H_2SO_4 (i.e. SO_3 chemically combined with H_2O), because the SO_4 radicle was seen to be the true acidic component of potassium sulphate. Two important conclusions thus thrust themselves upon chemists: (1) An acid is not a binary compound of *oxygen* with an electro-negative element, but a combination of *hydrogen* with an electro-negative radicle; (2) a salt is not a compound of two oxides (e.g. $K_2O.SO_3$), but a combination of a metallic element with the electro-negative radicle (e.g. SO_4) of an acid. The first of these conclusions, together with Davy's discovery that hydrochloric acid contained hydrogen but no oxygen, indicated that not oxygen, but hydrogen, is an indispensable component of acids, and this view was further strengthened by Graham's and Liebig's classical studies of the so-called polybasic acids. But so profound was Berzelius's belief in dualism, and so great was his authority, that the electro-chemical theory still continued to stand, and the conclusions just pointed out were not generally accepted for some years. The final blow to dualism came from the young organic chemistry, in which the electric theory had been applied as generally as in the inorganic branch of the science. About the middle of the thirties Laurent and Dumas made a series of important discoveries showing that chlorine and other elements could be substituted for the hydrogen of organic compounds, and that the nature of the latter was thereby affected very little. But if part of the molecule of a compound can combine with either of such electrically different atoms as those of hydrogen and of chlorine, then there is no reason for believing that that part is essentially either electro-positive or electro-negative, and hence there is no reason for believing that every compound is made up of two electrically opposite parts. The more evidence to this effect was brought forward, the more bitterly old Berzelius adhered to the electro-chemical theory. But finally it became evident to all that, as Liebig wrote, "the wheel of time cannot stand still," and "Berzelius is fighting for a lost cause;" and thus, toward the end of the thirties, electro-chemical dualism was overthrown. As a result of their struggle against dualism, chemists then fell into the opposite extreme, and adopted a purely unitary view of chemical combination. The molecule of a compound was conceived to be a composite unit somewhat like the solar system, in which the planets are held together by mutual attraction, but which does not by any means consist of two essentially different parts, endowed with two opposite forms of energy. Such unitary views of combination are still prevalent in chemistry to-day. But "the wheel of time cannot stand still," and recent years have forced upon us theories which make us feel that extreme unitarism is just as inadequate as extreme dualism. The elements certainly differ in their electrical properties, and chemists have even succeeded now in expressing those differences mathematically. Electricity, while not identical with the energy that causes the mutual attraction of atoms, is yet certainly one of the factors determining that attraction. At present, however, it is impossible to tell what compromise between chemical unitarism and electro-chemical dualism will ultimately be adopted.

Organic Chemistry. When the general principles of chemistry were established, and the atomic hypothesis had lent to the science a keen power of penetration, it became possible to approach the world of organic matter with the hope of shedding some light upon its mystery. Since then organic research occupied chemists almost exclusively during a greater part of the Nineteenth Century, and the result of that inquiry has been not only a vast store of empirical knowledge of organic compounds, but also a set of general principles that have strengthened the theoretical basis of the science, and have led to some of the great industrial achievements of modern times.

Early in the Nineteenth Century it was universally believed that organic substances could not be produced without the agency of the 'force of life.' Whether there is such a distinct 'force,' and what its relations may be to the measurable forms of energy, we do not know as yet. But we do know that organic compounds can also be produced by chemical agencies alone, without the intervention of anything else. For chemists have actually succeeded in building up from their elements many thousands of compounds that occur ready formed only in the organisms of animals and plants. The first of such compounds reproduced in the laboratory was urea, which Wöhler made artificially in 1828. The old belief, however, lingered, some chemists contending that urea could not be looked upon as a true organic compound. But when Kolbe synthesized acetic acid in 1845, and when other indisputably organic compounds were made from their elements, then all agreed that there was no essential difference between organic and inorganic compounds, and that the former were nothing but the compounds of carbon. At present many dyestuffs, drugs, and perfumes, which could once be obtained only from plants, are made artificially on a large scale, and so are many valuable carbon compounds that are not known to occur ready formed at all.

While the belief in an indispensable force of life thus delayed for a time the progress of chemical synthesis, chemists early directed their attention to the problem of molecular constitution. Berzelius was led to this problem by his electro-chemical theory. But in the twenties facts became known which made its study an imperative necessity also from a purely practical standpoint. Not small was the surprise of chemists when Gay-Lussac and Liebig found, in 1823, that silver fulminate had precisely the same composition as silver cyanate. Two years later, Faraday discovered a volatile liquid hydrocarbon that had precisely the same composition as ethylene gas. Berzelius first thought it unwise to abolish, on the evidence of a few facts, what had seemed an axiom—viz. that two different compounds cannot possibly have the same composition. But when he discovered that racemic and tartaric acids, too, had the same composition, he realized that the character of a substance must depend not only on its *composition*, but also on its *constitution*—i.e. not only on the kind and number, but also on the arrangement of the atoms in its molecule. Thus was born that great problem of modern chemistry—to determine the constitution of substances from the standpoint of the atomic hypothesis.

In 1832 Liebig and Wöhler made an important discovery: A series of compounds allied to benzoic acid were transformed by them into one another, and through all the transformations a group of atoms (made up of carbon, hydrogen, and oxygen), which they named 'the benzoyl radicle,' remained unchanged; the molecules of benzoic acid, benzaldehyde, benzamide, and benzoyl chloride, contained that radicle in common, as if it were a single atom of some element. The discovery of benzoyl was followed by Liebig's discovery of ethyl, a radicle common to ordinary alcohol and ether, and by Bunsen's discovery of cacodyl, which is possessed in common by several compounds of arsenic. The discovery of radicles was obviously the first step toward a knowledge of the constitution of compounds. But almost from the beginning the idea of radicles became associated with certain other ideas that could not be maintained in the light of more knowledge. Berzelius subdivided organic radicles, like the elements, into electro-positive and electro-negative. On the other hand, it was generally expected that radicles would eventually be isolated and thus constitute a series of simple compounds whose molecules would bear the same relation to the substances of organic chemistry as the atoms of the elements bear to the compounds of inorganic chemistry. But when the electro-chemical theory was overthrown, while attempts to isolate radicles remained fruitless, the opinion began to spread that the theory of radicles had made of organic chemistry a science of imaginary substances, and, hence, the sooner the theory was abolished the better for the young science. But how, then, were organic compounds to be correlated? A solution of this problem was suggested by Dumas in 1839. Continuing his researches on the substitution of different elements for one another in organic compounds, Dumas found that in acetic acid hydrogen could be exchanged for chlorine, and that the resulting compound (trichlor-acetic acid) was very much like acetic acid itself. Similar facts had already been observed, since 1834, by himself as well as by Laurent. It now occurred to Dumas that in correlating their substances chemists could be guided solely by the phenomena of substitution. Acetic acid and its chlorine-substitution product obviously belong to the same 'type,' and similar relations exist between other substances as well. If, therefore, the phenomena of substitution were investigated in connection with organic compounds in general, the result would be a grouping of compounds free from all hypothesis, but based on and exhibiting clearly their natural relationship. Such were, *in nuce*, Dumas's views, on the basis of which the celebrated 'theory of types' was gradually built up in course of the fourth and fifth decades. The most important contributions to the theory were made by Gerhardt, Wurtz, Hofmann, and Williamson. Gerhardt realized that Dumas's ideas were worthy of being developed, but he also realized that this could not be done without the aid of the idea of radicles. No objection could be raised against the latter idea, once it were freed from all unnecessary associations, especially from the belief that radicles were unalterable substances capable of independent existence. To say that benzoyl chloride, C_7H_5OCl; benzoic acid, $C_7H_6O_2$; and benzamide, C_7H_7ON, contain in common the benzoyl radicle—i.e. the group of atoms C_7H_5O—was only to express what was evident from their formulas. On the other hand, the recognition of radicles must obviously lead to the discovery of the relationship of compounds, and thus, together with the phenomena of substitution, guide in grouping compounds in accordance with the idea of types. In 1849 Wurtz and Hofmann discovered a series of compounds that bore an unmistakable resemblance to ordinary ammonia, and could be considered as ammonia in which one or more hydrogen atoms were replaced by radicles. They proposed to group them together as belonging to the 'ammonia type.' In 1850 Williamson showed that alcohols, ethers, and acids could be referred to the 'water type.' Ordinary alcohol, for instance, whose formula is C_2H_6O, could be considered as water, H_2O, in which one hydrogen atom has been replaced by the ethyl radicle, C_2H_5. Ordinary ether, $C_4H_{10}O$, could be considered as water, H_2O, in which two hydrogen atoms have been replaced by two ethyl radicles, ether being thus $(C_2H_5)_2O$. Acetic acid, $C_2H_4O_2$, could be considered as water, H_2O, in which one hydrogen atom has been replaced by the radicle C_2H_3O. Now, ether, $(C_2H_5)_2O$, was obtained from alcohol, C_2H_5HO, by the use of dehydrating agents. Williamson therefore held, by analogy, that it ought to be possible to transform acetic acid, $C_2H_3O.HO$, into a compound, $(C_2H_3O)_2O$. When, in 1852, Frankland actually succeeded in effecting this transformation by the use of dehydrating agents, the usefulness of the type theory was demonstrated. For nothing is more striking proof of the value of a theory than its capacity for revealing unknown facts. To the types *ammonia* and *water* Gerhardt added the types *hydrogen* and *hydrochloric acid*, and for a time it seemed that all organic compounds could be grouped under these four simple types. It was soon found necessary, however, to introduce the ideas of 'condensed types,' like the condensed water type, $(H_2O)_2$, 'mixed types,' and the type *marsh gas*, CH_4. In course of the fifties the type theory thus gradually became less and less simple, and, hence, less and less valuable for the purpose of correlating organic compounds.

Meanwhile an idea of inestimable value had thrust itself upon chemists. Inspecting the typical formulas of compounds, they could not help noticing that certain radicles (e.g. methyl, CH_3, or ethyl, C_2H_5) were capable of replacing each a single atom of hydrogen; others were capable of replacing each two atoms of hydrogen, etc. In other words, some radicles were seen to be equivalent to an atom of hydrogen; others had double its combining capacity, etc. Hence the idea of the *valency* of radicles and atoms. Like most other general ideas, that of valency was not new. In a vague and more or less specialized form it may be found in the researches of Berzelius, Graham, Liebig, and others; and Frankland, who first clearly enunciated it, in 1852, justly points out that it was probably a vague recognition of the valency of radicles, as exhibited by the facts of substitution, that gave birth to the theory of types. Frankland's statements, however, attracted no attention. In 1858 Kekulé and Couper independently developed the same idea, the latter proposing to symbolize the combining capacity of different atoms by the dashes now generally employed in graphic formulas. Kekulé called attention to the quadrivalence of the carbon atom, as shown directly by compounds like the following: CH_4, CH_3Cl, CH_2Cl_2, $CHCl_3$, CCl_4; or indirectly by such compounds as CO_2, $COCl_2$. In the former compounds a single atom of carbon is seen to be equivalent to four atoms of hydrogen, and a single chlorine atom to a single atom of hydrogen, which is also shown by the formula of hydrochloric acid, HCl. In a compound like $COCl_2$, the oxygen atom must therefore be assumed to be divalent, and so it is directly shown to be by the formula H_2O. Kekulé soon came to the conclusion that in practically all organic compounds one carbon atom is combined with a quantity of other elements which is equivalent to four atoms of hydrogen. This gave rise to a lively controversy, the critic Kolbe especially maintaining that the valency of an element may not be the same in all of its compounds. Kekulé's view, however, was finally accepted by all, and in 1860 chemists the world over were busy determining the 'structure' of organic compounds—a problem which has since occupied the attention of a majority of them almost exclusively. The theory of types, the mother of structural theory, exhibited the radicles of compounds, and thus explained those cases of isomerism in which compounds are different because they contain different radicles. Those further cases in which the radicles themselves are differently constituted it could not explain. The doctrine of valency, showing the different ways in which the atoms can be linked in the radicles, has furnished a satisfactory solution of the problem of molecular constitution, and has completely explained the fact that the molecules of different compounds may be made up of the same atoms. At first Kekulé failed to appreciate the full value of his own ideas. In the very memoir in which he states the doctrine of valency, he advances the view that this doctrine cannot by any means solve the problem of the constitution of compounds; the old problem, he thought, might possibly be solved some day by physical chemistry. Perhaps he was not altogether wrong. For now, after half a century of experience, organic chemists are beginning to complain of the inadequacy of the structural theory, even with its more recent development—stereochemistry (q.v.)—and to look forward to some broader idea, that would correlate a larger number of known phenomena and permit of foreseeing a larger number of as yet unknown facts. What that idea will be, no one can tell as yet.

General Chemistry. The doctrine of valency could not have come into existence if not for the fact that toward the end of the fifties chemists had learned the true atomic weights of the elements. Without a knowledge of the true relative weights of atoms, it would have been impossible to know their true number in molecules, and, hence, impossible to know their true valencies. Atomic weights were determined, calculated, and re-calculated ever since Dalton first established the atomic theory. Dalton himself, as stated in a previous section of this article, determined atomic weights on the basis of certain simple assumptions. Soon afterwards Berzelius devoted himself to the problem with great assiduity. From the law of combining volumes, discovered by Gay-Lussac in 1808, Berzelius inferred that equal volumes of gaseous elements must contain equal numbers of particles. In 1819 Mitscherlich discovered the principle of isomorphism. (See Atomic Weights.) Berzelius had carried out about two thousand analyses, and had thus determined the relative quantities of the elements contained in a great variety of compounds. By combining the principle of isomorphism with that of equal gaseous volumes, he was now able to calculate the atomic weights of the elements. Now, his principle of equal volumes was not quite correct. To him the particles of a gaseous element in the uncombined state were isolated atoms. While he distinguished between the particles of compounds and the atoms of elements, he failed to distinguish between the free particles of elements and their atoms. That the particle of an element might be made up of two or more single atoms, it would have been impossible for him to admit; for, according to his electro-chemical theory, only unlike atoms could exist in combination with one another. Avogadro's memoir of 1811, in which more correct views on the subject had been advanced, therefore remained unnoticed, and Berzelius's atomic weights were for years employed by all. Nor were most of those figures wrong; for in many cases Berzelius's error eliminated itself, owing to the fact that the molecules of the ordinary gaseous elements are made up of equal numbers of atoms. Knowing the true atomic weights of the ordinary gaseous elements, Berzelius was able to obtain correct figures for many other elements, with the aid of the principle of isomorphism and certain other principles that need not be explained here. Thus, his figure for mercury was 200, that for phosphorus 31, that for sulphur 32—figures practically identical with those accepted at present. In 1827, however, Dumas invented his celebrated method of determining vapor densities, and undertook to apply Berzelius's principle of equal volumes to elements which are not ordinarily gaseous. Finding that the vapor of mercury is 101 times as heavy as an equal volume of hydrogen, the vapor of phosphorus 62.8 times, and the vapor of sulphur 96 times, as heavy as hydrogen, Dumas concluded that the relative weights of their atoms must be, respectively, 101, 62.8, and 96, and not 200, 31, and 32, as Berzelius thought. The error of Berzelius's principle thus emerged in the results of Dumas. But instead of rectifying the error of his principle by introducing the concept of the *molecules* of elements, Berzelius only concluded that the principle was unreliable. The result was that chemists began to disagree as to the true values of the atomic weights, and many even abandoned the hope of ever knowing atomic weights altogether, and decided to use nothing but *equivalents*. These represented the weights of elements that were capable of combining with, or of being replaced by, unit weight of hydrogen. For example, Berzelius's view that an atom of oxygen was 16 times as heavy as an atom of hydrogen was abandoned, and as hydrogen combined with 8 times its weight of oxygen, the latter was represented by its equivalent 8. But the use of equivalents was not universal, many chemists using systems in which the figures were partly equivalents, partly atomic weights, and thus for years great confusion reigned in chemical notation, the true purpose of which is to avoid confusion by exhibiting the composition of substances in the simplest and clearest possible manner. In the forties, Laurent and Gerhardt became convinced that the progress of knowledge in organic chemistry was seriously impeded by the lack of a consistent system of atomic weights. Their researches soon led them to distinguish clearly between the atoms and molecules of elements, and to grasp the full value of Avogadro's principle for determining the relative weights of molecules. With the aid of this principle, Gerhardt found the true atomic weights of the elements; and, in the latter part of the fifties, his pupil Cannizzaro demonstrated clearly the consistency of the principle with all known facts. Thus was paved the way for the doctrine of valency. A few years later (in 1869) Mendeléeff and Lothar Meyer established a remarkable connection between the properties of the elements and their atomic weights (see

Periodic Law), and thus the correctness of the latter was confirmed in a very striking manner.

The further progress of general chemistry has been mainly in connection with the various subdivisions of physical chemistry, brief historical accounts of which may be found under Reaction; Solution; Dissociation; Thermochemistry; and Electrochemistry. See also the article Laboratory.

Conclusion. In conclusion, we could not do better than emphasize, with Dr. F. W. Clarke, the necessity of systematization of chemical research. The birth of general scientific ideas may be beyond control; but the search of empirical knowledge, which must form the basis for all generalizations, can and ought to be organized instead of being left entirely to the inclinations of individual investigators. Some organization of research has been realized at the German universities, with splendid results; and further organization is certain to yield an even more abundant crop.

LITERATURE.

In a science whose progress is so phenomenally rapid as that of chemistry, even the best books are likely, within a few years of publication, to lose more or less of their original value. Nevertheless, it is safe to say that most of the following works will, in the ordinary course of events, retain their interest for a number of years to come. The list includes some of the best-known modern works on descriptive, theoretical, and technical chemistry. More specialized works are noted in the articles on various chemical topics.

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CHEMISTRY, AGRICULTURAL. The branch of chemical science which deals with the problems of the soil, the nutrition of plants and animals, the composition of their products, and their value as food for man and animals. Its field borders on those of vegetable and animal physiology on the one hand, and of physics and geology on the other; and in working out problems in agriculture, the agricultural chemist has frequently been led into these adjoining branches of science. His work has, however, been essentially chemical, and thus a quite distinct and well-defined branch of chemical science has been built up.

HISTORY. The first attempt to bring together in a systematic manner the teachings of chemistry as applied to agriculture was made by Sir Humphry Davy, in a series of lectures before the British Board of Agriculture, early in the Nineteenth Century (*Elements of Agricultural Chemistry*, 1814). Davy regarded the soil as the source of all nourishment of plants, and he announced the general principle that plant food must be practically dissolved before it can enter the organism of the plant. But while he and his predecessors knew the value of certain materials for plant food, they did not know the constituents which gave them this value. Oil, for example, was long supposed to be one of the most valuable fertilizing constituents, and Davy supposed sugar to be also. One of the reasons for this error was undoubtedly the belief that the carbon of plants was derived through the roots from the humus—i.e. the partially decomposed organic matter of the soil. The errors of this 'humus theory' were pointed out, about 1840, by Justus von Liebig, who in his generalizations drew heavily upon the works of Saussure and Boussingault. Liebig showed the carbonic acid of the air to be the source from which plants derive their carbon, and the leaves to be the medium through which this assimilation takes place. He thus laid down a fundamental principle of physiological botany. He established the interdependence of plants and animals with relation to carbonic acid, which is a vitalizing principle of the one and an excretory product of the other. In place of the 'humus theory' he advanced his famous 'mineral theory,' according to which the soil furnishes to plants their ash or mineral constituents; and this led him to suggest the employment of artificial fertilizers for keeping up the supply of the mineral constituents of the soil, and thus maintaining its fertility. Liebig's views, with some modifications, form the basis of our present theories; but, on the other hand, we have learned much regarding the true value of humus and its functions in the soil. See MANURES.

In the field of animal nutrition, or the utilization of plants and their products in feeding animals, agricultural chemistry has likewise led to the establishment of the underlying principles and the methods of research. The earlier ideas regarding the valuable food constituents of plants were equally as crude as those regarding the fertilizing constituents. There was a prevalent belief in a subtle, undefined property of forage plants, upon which their nutritive properties largely depended, and it was a long time before the connection between nutritive value and chemical composition was traced. Boussingault, in France, attempted to classify feeding stuffs on the basis of their nitrogenous constituents; and Thaer, in Germany, compared them with hay, and prepared his tables of 'hay values.' At length Henneberg worked out a classification of the nutritive constituents of feeding stuffs, and a method of analysis known as the Weende method. His classification and method have been extensively employed, having served as the basis in most of the investigations since. These studies in animal nutrition have led the agricultural chemist into a field of inquiry intimately connected with physiology proper; and in the development of the present theories, as well as in their application in practice, agricultural chemistry has contributed much more than physiology itself, and has usually been the leader.

Agricultural chemistry laid the foundation for a science of agriculture, and one of the most important and far-reaching influences of the early agricultural chemists was that which led to the establishment of the agricultural experiment station. The teaching of agriculture in agricultural schools and colleges preceded it in most countries, but the investigation and experimentation was for the most part in the hands of the agricultural chemists. Their work led them into agricultural experiments of various kinds, as a matter of necessity, and Liebig, Boussingault, Lawes and Gilbert, and others, laid out experimental fields for carrying on their studies and testing their theories. As the practice of fertilizing the soil became introduced in the Old World, farmers found themselves confronted by a variety of problems relating to their soils and fertilizing materials which they were unable to answer, and they quite naturally turned for advice and guidance to the agricultural chemists who had developed these theories. Thus experiment stations came to be established, first by agricultural societies of private individuals, and later with Government aid. (See AGRICULTURAL EXPERIMENT STATIONS.) In the United States, the researches and writings of S. W. Johnson (*How Crops Grow*, 1869; *How Crops Feed*, 1870), C. A. Goessmann, E. W. Hilgard, G. C. Caldwell, W. O. Atwater, and other chemists, prepared the way for the establishment of experiment stations as State institutions; and out of these has grown a system of stations under Government aid and supervision, embracing every State and Territory in the Union, and providing, incidentally, the most munificent endowment for agricultural-chemical research to be found in any country.

AGRICULTURAL ANALYSIS. The chemical substances with which agricultural chemistry is primarily concerned are those comprising the ash, or mineral constituents, and the food constituents of plants. As the soil is the source of the mineral constituents of plants, and usually of the nitrogen also, those elements of the soil which serve as food for plants—i.e. which enter into their composition—are embraced in the field of agricultural chemistry; and, on the other hand, as farm animals derive their nourishment from plants, agricultural chemistry is naturally concerned with the food constituents of these plants. The plant is thus a link between the soil and the animal, as regards the mineral elements; but the plant gets its carbon from the air, and develops from it a series of carbon-containing compounds, which, in turn, are the source of carbon to the animal.

In the analysis of the plant, we find first that the tissue contains a very large percentage of water—up to 90 per cent.—which is indispensable to its growth and circulatory system. This water is expelled by heating the plant in a dry oven at about 212° F. for several hours. The residue, or *dry matter*, consists of organic constituents and a relatively small proportion of ash. The former are combustible, and hence the ash is determined by burning the sample. The ash consists chiefly of lime, magnesia, potash, soda, iron, silica, chlorine, and carbonic, sulphuric, and phosphoric acids. In plant analysis, determinations are made of all these constitutents. In analyzing fertilizers, only the potash, phosphoric acid, and nitrogen are considered, these three being often spoken of as the fertilizing constituents. In fertilizer analysis, it is customary to carry out separate determinations of the phosphoric acid soluble in water (mono-calcium phosphate), of 'reverted' phosphoric acid —i.e. that soluble in a standard solution of ammonium citrate (di-calcium phosphate), and of the insoluble form (tri-calcium phosphate). The soluble and reverted forms are more readily available to plants than the insoluble form, and are valued at a higher price. In complete analysis of soils, other mineral ingredients besides the potash and phosphoric acid are determined, such as magnesium, calcium, sodium, manganese, iron, alumina, and silica, and also the humus. The latter is a very important constituent of soil in determining its fertility, ability to retain moisture, and to support biological changes which render the soil constituents available to plants. Mechanical analysis of the soil is also made, in which the sample is separated into particles of different sizes by means of water, and the percentage of each grade ascertained. The value of an agricultural soil depends to a considerable extent upon its mechanical condition, as shown by this analysis, since this largely governs its capacity for moisture, capillarity, suitability for certain crops, and other qualities. In the examination of soils, there have been many attempts to estimate the amount of the fertilizing ingredients present in forms available to plants. This is done by extracting the soil with weak acids and analyzing the extract, or by growing plants in pots of the soil and analyzing the crop. Important as this matter is in determining the fertilizers needed by soils, no method has yet been devised which is entirely reliable and satisfactory.

Of the organic constituents of plants, those of most concern to the agricultural chemist are the so-called food constituents, which determine the value of the plant as food for animals or man. These may be divided into the nitrogenous, or those containing nitrogen, and the non-nitrogenous substances. The nitrogenous are grouped under the name of protein, and include albuminoids, containing about 15 to 18 per cent. of nitrogen, the amides, and a variety of other bodies. Of the non-nitrogenous constituents, the most important are (1) the fats and oils and (2) the carbohydrates, including starch, sugars, pentoses, cellulose, fibre, etc. The protein of plants is estimated by determining the nitrogen and multiplying the result by 6¼, on the assumption that the protein constituents average about 16 per cent. of nitrogen. As this does not always hold true, the result is subject to slight error. In determining the fats, the material is extracted with ether, in a special extraction apparatus, the ether expelled, and the residue weighed. This is not pure fat, but contains also the waxes, chlorophyll, lecithin, and some other bodies in small quantities. The fibre or cellulose is usually determined separately from the other carbohydrates. This is done by dissolving out the other constituents of the plant with dilute alkali and acid, and weighing the residue, a correction being often made for the remaining traces of nitrogen and ash. As a large variety of other carbohydrates are usually present, which are of similar feeding value, they are not determined individually, except for special purposes, but are grouped with the organic acids and some other substances about which little is known, under the general head of nitrogen-free extract. This is done on the supposition that everything else has been accounted for in the water, ash, fat, protein, and fibre determined separately; and hence the difference between the sum of the percentage amounts of these and 100 represents the nitrogen-free extract. Accurate methods have been worked out for determining the sugars, starches, pentoses, galactose, etc., separately, and these are used for special analysis. For example, in studying sugar-producing plants, the sugar is determined very exactly. The principal organic acids in plants are oxalic, malic, citric, and tartaric, and these are determined on occasion, as in analysis of fruits, beverages, and some vegetables.

In the analysis of dairy products, which comes within the scope of the agricultural chemist, the principal subjects are milk, butter, and cheese. In milk analysis, the specific gravity (by lactometer), water, total solids (dry matter), fat, casein, sugar, and ash are determined, the fat being the constituent considered especially, as showing the richness of the milk and its value for butter and cheese making. (See MILK; DAIRYING.) Butter is analyzed mainly with a view to detecting adulteration with oleomargarine, renovated butter, etc. Cheese is examined for water, fat, nitrogen, and ash, the principal objects being to determine its food value and to detect adulteration. There is a long list of other substances which come within the scope of the agricultural chemist for analysis, such as fungicides and insecticides, human foods and beverages, tanning materials, etc., which can only be referred to here.

In dairying, the investigations of agricultural chemistry have been far-reaching in their results, largely modifying dairy practice in a number of respects. For example, Babcock has worked out a rapid, simple, and accurate method of testing milk and cream as to their fat content. This test has come into very general use, and has not only changed the method of paying for milk at creameries and cheese factories, but led to the selection of cows giving richer milk. The same chemist, with Russell, a bacteriologist, has made elaborate studies of the ripening of cheese, and has discovered an inherent ferment in milk whose presence is held to account for most of the characteristic changes during ripening.

The inspection or control work, which is now carried on in nearly every country, has afforded agriculturists needed protection in the purchase of fertilizers, feeding stuffs, and the like, and reduced the traffic to a business basis. The percentages of essential constituents in these materials is now guaranteed by the sellers, and the goods inspected to see that they meet the guarantee. Dairy products of various kinds have been subjected to systematic inspection, and of late this has been extended to materials used for insecticides and fungicides, the consumption of which is assuming large proportions.

The earliest treatise on methods of agricultural analysis in the United States was published by Prof. G. C. Caldwell in 1869. Since 1884 the Association of Official Agricultural Chemists has been a potent factor in testing and developing methods of analysis. It holds an annual meeting and publishes a large volume of proceedings and papers. Similar associations exist in Germany, Holland, and Belgium, and a number of other European countries.

Feeding and Metabolism Experiments. The analysis of plants as above shows the total amount of the constituents present; but as these are not all in form to be digested by the animal, digestion experiments are made by the chemist on live subjects. In these experiments the amount and composition of the feed consumed by the animal, and of the corresponding excreta voided, are definitely determined for a short period, and by calculation the percentages of protein, fat, fibre, and nitrogen-free extract actually digested are ascertained. These percentages are called the *coefficients of digestibility*, and have to be determined for each feeding stuff separately. A method of artificial digestion has been worked out, in which the feed is treated with pepsin and hydrochloric acid and with pancreas solution, but it is not generally considered to be as reliable as the natural method. In recent years the bomb calorimeter has come into quite extensive use in the study of feeding stuffs, for measuring the fuel value, or the capacity of the feed for furnishing heat and energy for work. In this apparatus a sample of the material is ignited with oxygen in a platinum-lined bomb, and the heat evolved is measured by means of very accurate thermometers, suspended in a water-jacket surrounding the bomb. For further details regarding fuel value and the subject of animal nutrition in general, see Feeding Stuffs, and Feeding Farm Animals.

Very refined and delicate methods and apparatus have also been elaborated for studying the functions of the different nutrients in animal feeding, and the way in which they are used in the animal body in producing animal heat and energy for work, repairing the waste of the body, and making growth or meat or milk. In the ordinary feeding experiment with cattle, or sheep, or pigs, the herd is divided into equal lots, and fed in periods varying from a few weeks' to several months' duration, account being kept of the amounts of food of known composition which each lot or individual eats, and of the changes in weight. At the conclusion the animals are often slaughtered and the composition of the carcass determined. In this way the feeding value of nearly every available feeding stuff, and of a great variety of compound rations, has been studied, and the specific effect of nutrients from different sources on the quality of the beef, pork, butter, etc. Much of this feeding work has also been directed toward the relation of live stock to the problem of maintenance of soil fertility, and the development of a rational system of agriculture. It has been shown that by feeding the crops largely on the farm where they are produced, and applying the manure to the soil, the fertility of the latter can be conserved, the supply of humus kept up, and the expense for commercial fertilizers reduced to a minimum. The reason of this is that when crops are fed to growing stock or milch cows, from 60 to 90 per cent. of their fertilizing ingredients, voided in the solid and liquid manure, are retained upon the farm.

In studying the fundamental principles of nutrition, and the function of the different nutrients, the total income and outgo of the body during the experimental period must be determined. This includes the carbonic acid and other gases given off, as well as the excreta. For measuring these gases a respiration apparatus is employed, which usually consists of a closed chamber in which the animal or person is placed, with means for measuring and sampling automatically the air as it enters and leaves the chamber. With such a respiration apparatus Henneberg, Kühn, and others have worked out the functions and relative values of the different nutrients, and many of the underlying principles of nutrition. Atwater and Rosa have combined a calorimeter with the respiration apparatus, and made many improvements in the accuracy of the latter. In their apparatus the chamber in which the subject is placed is a calorimeter, with very delicate arrangements for registering the heat given off by the subject. With the aid of this highly sensitive respiration calorimeter, it has been possible to demonstrate the absolute conservation of matter and energy in the body. A similar apparatus for use with animals has been constructed by Armsby.

Fertilizer Experiments. The investigations of the agricultural chemist in studying the fertilizer requirements of different crops, the value of different forms of plant food and their effect on the quality of the crop, and a wide range of similar problems, are conducted either in pots or in plats in the field. The preliminary studies are often made in pots or boxes, filled with sterile sand, to which definite amounts of humus and fertilizers have been added. The conditions are under complete control, and every part of the plants can be saved for analysis. These pots are usually mounted on trucks, so that they can be placed under cover at night or during a rain. The plat work is especially for testing theories under field conditions, studying fertilizer requirements, the draught of different kinds of crops, the changes in humus content and fertility of the soil under various systems of treatment, and the like. The plats are most commonly about one-tenth of an acre in area, selected with much attention to uniformity of the soil, and often under-drained and provided with basins for collecting the drainage water from each plat. Great care is exercised in preparing the land, applying the fertilizers, cultivating the crops, and harvesting them, so as to have the treatment of all uniform except as regards the special experimental feature. For studying soils in the field, samples are taken at intervals with a tube specially made for the purpose, which is driven into the ground to the depth required, removing a core of the soil. These samples are taken to the laboratory and tested or analyzed. These studies of plant production and soil fertility have been accompanied by a gradual refinement of methods, and a great deal of investigation has had purely that aim. The field covered has been very broad, and has not always been strictly chemical. For example, the discovery of the ability of leguminous plants (clovers, peas, and the like) to appropriate to their use the free nitrogen of the atmosphere, and thus, under certain conditions, to enrich the soil with nitrogen (the most expensive fertilizing element) from the air, was made by a German agricultural chemist, who also demonstrated the agency of bacteria in bringing about this assimilation. See also GREEN MANURING; ROTATION OF CROPS.

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CHEMISTRY, ANALYTICAL. See ANALYSIS, CHEMICAL. Many special processes of analytical chemistry may be found described under the names of the substances in connection with which they are usually employed.

CHEMISTRY, ORGANIC. See CHEMISTRY; VALENCY; CARBON COMPOUNDS; STEREOCHEMISTRY; HYDROCARBONS; ALCOHOLS; ALDEHYDES; KETONES; ETHERS; ESTERS; AMINES; AMIDES; PHENOLS; DIAZO-COMPOUNDS; CARBOHYDRATES; ALKALOIDS, etc. All the more important organic compounds may be found described under their special names.

CHEMISTRY, PHYSICAL. See AVOGADRO'S RULE; MOLECULES—MOLECULAR WEIGHTS; REACTION; SOLUTION; DISSOCIATION; THERMOCHEMISTRY; ELECTROCHEMISTRY; PHOTOCHEMISTRY; EVAPORATION; DISTILLATION; BOILING-POINT; MELTING-POINT; CRITICAL POINT; ACIDS, etc.

CHEMISTRY, PHYSIOLOGICAL. One of the biological sciences, having for its object the study and investigation of the manifold chemical processes taking place in living organisms, both animal and vegetable. Physical, or mechanical, physiology deals with those functions of living organisms explainable by physical laws and studied by physical methods. Chemical physiology, or physiological chemistry, deals with those functions explainable by chemical laws and studied by chemical methods. In the study of physiological chemistry, therefore, the facts to be collected and the methods pursued are almost wholly chemical, while the application is purely physiological.

In the early days of physiological chemistry, energy was devoted mainly to the simple study of chemical composition. The various tissues and organs, especially of the higher animals, were analyzed, their chemical composition examined, and the chemical nature of the various proximate principles occurring in these tissues ascertained. It was found that twelve chemical elements enter into the composition of all living organisms—viz. carbon, nitrogen, hydrogen, oxygen, sulphur, phosphorus, chlorine, sodium, potassium, calcium, magnesium, and iron—while more recently iodine has been found widely distributed in organic combination. The first six of the above elements enter mainly into the make-up of the organic substances of the living body, while the last six occur chiefly as inorganic or mineral compounds. Sulphur and phosphorus, however, are especially characterized by the fact that they are widely distributed in organic combination—that is, as an integral part of complex organic compounds, as proteids, nucleo-proteids, and various crystalline substances—while at the same time in oxidized form as sulphates and phosphates of the alkalies and alkali earths, they are ever present as part of the inorganic salts, or mineral matter, so abundant in animal and vegetable tissues. Iron likewise occurs both in organic combination, as in ferruginous nucleo-proteids and in the pigment of the red blood-corpuscles, and in the form of simple iron salts. The ideas of physiologists were revolutionized, and physiological chemistry took on new dignity, when it was seen that the various chemical substances—both simple and complex—formed in the tissues of living organisms could be constructed in the laboratory by comparatively simple methods. (See CHEMISTRY.) As a result, there rapidly developed great activity in the study of the chemical nature and chemical relationship of the organic compounds occurring in the body; methods were devised for producing them artificially; their genetic relationships were traced out; and much light was thrown upon the conditions attending their formation in the body. To-day the study of the chemical constitution of the various end-products of catabolism formed in and excreted from the body has given most useful information regarding a host of chemical processes occurring in the organism, and has enabled the physiologist to trace out many of the individual steps in the breaking down of complex organic material. In other words, chemical methods and simple chemical principles are quite sufficient to explain the nature of the many processes going on in living organisms by which the life and activity of the organism are maintained.

The various chemical processes characteristic of living organisms may be divided into two main groups—viz. synthetic and analytic; i.e. building up and breaking down. Synthetical processes are most prominent in the vegetable kingdom. The plant-cell alone has the power of building up complex organic compounds out of simple elementary substances. The most striking illustration of this constructive power is seen in the formation of proteid or albuminous material. This important constituent of every living cell, in part the chemical basis of protoplasm, originates solely through the synthetical power of the plant-cell. The carbonic acid of the atmosphere furnishes the carbon, hydrogen is drawn from the moisture, nitrogen from ammonia or nitrates in the air and water, oxygen from the air, sulphur and phosphorus from the sulphates and phosphates of the soil. From these elements proteid, the most complex organic substance known in nature, is constructed. As indicative of its chemical composition, we ascribe to it various formulæ according to its exact nature, for there are many different proteids in both the animal and vegetable kingdoms. Egg-albumin is represented by the formula $C_{204}H_{322}N_{52}O_{66}S_2$; vegetable globulin, by the formula $C_{292}H_{481}N_{90}O_{83}S_2$.

The proteid of the animal kingdom is simply an alteration product of the vegetable synthetic product. The animal cell can simply transform and modify, but it cannot construct proteid; that is the province of the vegetable cell only. Synthetical processes, however, do occur in the animal kingdom, but they are limited in extent. A good illustration is afforded by the formation of hippuric acid in the kidneys. Glycocoll and any benzoyl-containing compound, on passing through the kidney, are, under the influence of the epithelial cells of the kidney and the ever-present blood, made to combine, and hippuric acid results. This reaction may be formulated as follows:

$$\underset{\text{Glycocoll}}{CH_2(NH_2)COOH} + \underset{\text{Benzoic acid}}{C_6H_5COOH} =$$

$$\underset{\text{Hippuric acid}}{C_6H_5CO.NH.CH_2COOH} + \underset{\text{Water}}{H_2O}$$

As is evident from the reaction given, this form of synthetical operation does not involve much chemical transformation; two moderately complex substances are simply combined with liberation of a molecule of water, a process not to be compared with the building up of a complex albuminous body from simple groups or radicles.

In the animal body analytical processes are most conspicuous. Here complex organic material is transformed and ultimately broken down with liberation of the energy stored up in the large molecules, and which came primarily from the sun. These analytical or destructive changes are of various kinds, such as *hydrolysis, oxidation, reduction*, etc.

Examples of hydrolytic decomposition or change are perhaps best seen in connection with the digestive processes. Here the various classes of foodstuffs, under the influence of the digestive juices, are gradually transformed into more or less soluble and diffusible products well fitted for absorption. Proteid, for example, is converted into a row of soluble proteoses and peptones; a transformation brought about by certain enzymes or ferments, such as pepsin and trypsin. The change, little understood, is termed catalytic, since it is assumed to occur through mere contact of the enzyme; but what really happens is the taking on by the proteid of one or more molecules of water (hydrolysis) with subsequent splitting or cleavage of the molecule, and formation of a number of simpler products. Hence, the products are frequently termed hydrolytic cleavage products. A like transformation occurs in the digestion of starch with saliva or pancreatic juice, whereby soluble dextrins and sugars result, under the influence of the enzymes contained in the above secretions. Further, cane-sugar, under the influence of the invert ferment secreted by the intestinal cells, is split into two molecules of a simpler sugar during digestion, as a result of simple hydration. The reaction which takes place may be represented as follows:

$$\underset{\text{Cane-sugar}}{C_{12}H_{22}O_{11}} + H_2O = \underset{\text{Dextrose}}{C_6H_{12}O_6} + \underset{\text{Dextrose}}{C_6H_{12}O_6}$$

Hydrolytic processes of the above type are very common methods by which chemical changes are effected in the animal body.

Oxidative changes are especially conspicuous in animal tissues. Oxidation is the principal method by which the organic material of the tissues is broken down. Naturally, this oxidation is brought about in some measure by the oxygen coming to the tissues in the arterial blood, but there are present in many, if not in all, tissues of the animal body, as well as in vegetable tissues, peculiar ferments such as the oxidases which are capable of inciting oxidation. Many of the oxidative processes going on in the animal body seem to be connected with the life of the cell of the tissue or organ involved, but it is quite probable that in most, if not in all, such cases there are really oxidizing enzymes present, generated no doubt by the activity of the cell.

The best example of reduction in the animal body is found in the changes going on in the lower end of the small intestine and at the beginning of the large intestine, where various reducing gases are generated through the growth and activity of anaërobiotic bacteria. These micro-organisms are ever present in the intestine, and, as products of their growth, hydrogen, carburetted hydrogen, hydrogen sulphide, and carbonic acid are formed in varying amounts. These reducing gases are quite able to reduce other substances brought in contact with them in the intestine, and it is in this way that the pigments of the urine and of the fæces are formed from the bilirubin of the bile.

The ultimate object of the various chemical processes occurring in the animal body is the liberation of the energy necessary to keep up the vital processes. Upon this ability depends life and all forms of vital activity. The potential energy of the foodstuffs, the fuel of the animal body, is derived from the sun. As Bunge has stated it, "all the potential energy of vegetable substances is converted sunlight." The foodstuffs, whether animal or vegetable, are rendered capable of absorption by the several digestive processes. After passing into the blood or lymph, they are carried to the various organs and tissues of the body, where they are assimilated, and, by processes of anabolism, are built up, in part, into the tissues of the body, or in part directly burned with liberation of their energy. This energy shows itself either in the form of heat or as work—i.e. muscular movements, or organized movements by which we perform work. The sum of the work performed by an animal, and of the heat which it gives out, is the exact equivalent of the potential energy contained in the food taken in, or in the material of the tissues burned up. This energy is liberated as the result of oxidation, and the energy is essentially the same in amount, whether the oxidation is carried on in the body or by combustion outside of the body. In other words, the amount of energy liberated is the same whether the foodstuff or its equivalent is burned directly to carbonic acid and water, or whether it is broken down gradually, step by step, until the final stage in the oxidation is reached. A man of average body weight, doing an average amount of work, must consume food material sufficient to yield 3000 kilogram-degree units of heat, or 3000 large calories, if he is to keep himself in equilibrium. The amount of heat required to keep the body continuously at 38° C., no matter what the temperature of the surrounding air, is by no means small, and, in addition, it is to be remembered that all the involuntary muscular movements, such as the beating of the heart, the muscular movements involved in respiration, and the constant movements of the intestinal walls, involve a large expenditure of energy which is quite independent of the energy required for muscular contraction when some task is to be performed. Consequently, in the case of an active man, the amount of chemical activity involved in the various processes incidental to the liberation of the required energy is large.

The efficient and economical liberation of this energy in the body is dependent not only upon the completeness of digestion, the readiness of absorption and assimilation, and the efficiency of the circulation, but much depends also upon the proper working of the excretory apparatus. Waste products formed in oxidation must be removed, otherwise the physiological rhythm is interfered with. The ashes and clinkers must be taken from the human furnace if the fires are to be kept burning freely. For this purpose, the skin, lungs, and kidneys are efficient channels, and the study of the excretions poured out through these several emunctories throws much light upon the extent and character of the oxidation going on in the body. It is a truism that the chemical study of the urine throws light especially upon the extent and character of the proteid metabolism going on in the body. The nitrogenous waste products—those which come from the breaking down of proteid material—find their outlet through the urine, and abnormalities in this excretion have a significance easy of interpretation.

It must not be overlooked, in considering the domain of physiological chemistry, that its scope is a broad one. The chemical processes going on in the animal body, for example, are multitudinous. There are few functions in which physiological chemistry does not play some part, and the light which its study throws upon physiology as a whole can hardly be estimated. The phenomenon of muscular contraction is in great part chemical. Until the discovery of muscle-plasma and the contained myosinogen by Kühne, physiologists were in the dark regarding what took place inside the muscle-fibre during contraction and after the death of the fibre. The discovery of glycogen in the liver by Claude Bernard, and the relationship of glycogen to the sugar of the blood, opened up the whole subject of the glycogenic function of the liver, and thereby paved the way for a clearer understanding of the function of carbohydrate material in the body. The subject of secretion and the mode of formation of the digestive enzymes from their precursors, the zymogens, inside the cells of the secreting glands, was unraveled in great part through the application of chemical methods by such eminent physiologists as Corvisart, Kühne, Heidenhain, and Langley.

The study of lymph-formation was rendered possible through the use of chemical methods, and the same methods of study have taught physiologists all that is known regarding the chemical nature of the blood, its various chemical constituents, and the various parts played by the serum, plasma, and corpuscles in the coagulation of the blood and in many normal and abnormal processes.

Metabolism in the liver—aside from glycogen-formation—has had much light thrown upon it by chemical methods of study, and the whole broad subject of internal secretion and the ductless glands has been helped forward at a rapid pace by the work of physiological chemists, who have unraveled in part the chemical nature of the specific substances responsible for the physiological action of the various secretions.

Lastly, mention may be made of the part which physiological chemistry is now playing in the development of our knowledge concerning bacteriology and the infectious diseases. The micro-organisms which are responsible for the various infectious diseases now preying on mankind owe their action in great part to specific chemical poisons which they produce. The chemical nature and physiological action of these poisons is being carefully studied, and, with fuller knowledge of their properties, ready methods for combating these diseases will be available. Even to-day our knowledge of these toxins is considerable, and more than one antitoxin has been discovered by which immunity can be secured or a logical method of treatment devised. Here is a large and practical field for the application of the principles and methods of physiological chemistry, and we may hope in the near future for such an extension of our knowledge of bacterial poisons as will enable us to cope successfully with these destroyers of health and life. A study of physiological chemistry promises expansion of knowledge concerning the normal changes occurring in the organism, and also affords a means of recognizing the approach of abnormal conditions, the forerunners of disease and death.

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The substances forming the chemical basis of the organisms of animals and plants may be found described under their special names. See also FOOD.

CHEMISTS AND DRUGGISTS, LAWS RELATING TO. In the United States the terms apothecaries, druggists, pharmacists, and sometimes chemists, are used with little or no distinction as names of those licensed to compound and sell drugs and medicines upon prescriptions of physicians or otherwise; in Great Britain, however, a legal distinction exists between the three classes —apothecaries, chemists and druggists, and pharmaceutical chemists. The law of 1868, designed especially to restrict the sale of poisons, made the classification just referred to for the sake of public convenience. Under this law, apothecaries form practically a lower branch of the medical profession, having the right to practice in certain classes of cases; chemists and druggists are those who have passed an examination at the pharmacy college, and have received a license to sell and compound drugs and poisons; pharmaceutical chemists are those who have passed a second, 'major,' examination, and who constitute a higher branch of the profession.

Laws relating to the business of selling and compounding drugs and medicines, under whatever name the business is carried on, and whether in the United States or in England, are either laws limiting and defining the qualifications of those who may carry on the business, or restricting the sale of poisons or intoxicating liquors, or defining the liability for injuries caused by carelessness or ignorance. Generally speaking, the statutes of the States in the United States require a person wishing to adopt the profession of druggist either to pass an examination before a board appointed for that purpose, or to produce a diploma from a college of pharmacy recognized as having authority and weight. Either State or city ordinances prescribe the conditions under which poisons may be sold, directing, for instance, that certain kinds of labels be used on bottles containing the poisons, and that the names of persons purchasing be entered in a book open for public inspection. Druggists are sometimes also forbidden to sell certain drugs or liquors except on physicians' certificates. Gross carelessness on the part of a druggist in compounding a prescription, if it leads to death or serious injury, is a penal offense; if death ensue, the offense usually amounts to manslaughter.

CHEM'ITYPE. A process invented by C. Pül, of Copenhagen, in 1843, for producing on a metal plate an engraving in relief. A design is etched or engraved on a polished plate of zinc, and the depressions filled with a melted metal, the composition of which is secret, which is then reduced to the exact level of the zinc, so that the design appears as if inlaid. An acid is then applied to the surface, which dissolves the zinc, leaving the inlaid metal in relief, and from which an electrotype may be made, or the original may be used directly on the printing-press. The process was formerly employed for printing maps, but is now seldom used. The term chemitype has also been applied to several processes for obtaining drawings or impressions from an engraved plate in relief, suitable for printing on an ordinary press.

CHEMNITZ, kĕm'nĭts (from OCh. Slav. *kamenĭ*, Lith. *akmu*, stone, Gk. *ἄκμων*, *akmōn*, anvil, Skt. *aśman*, stone). The foremost manufacturing town, and the third in population, in the Kingdom of Saxony, situated in a fertile valley at the base of the Erzgebirge, and at the confluence of the river Chemnitz with three other rivers, about 50 miles west-southwest of Dresden (Map: Germany, E 3). The city consists of an older inner town, almost circular in form, intersected by narrow streets, completely surrounded by modern suburbs. Among its numerous squares and public places are the Hauptmarkt, which contains the Old Rathaus, a handsome late Gothic structure; the Newmarkt; the Schillerplatz, with the Church of Saint Peter and the Royal Technical Schools; the Stadtpark, and the gardens surrounding the castle pond. Its notable public buildings include the Church of Saint James, restored in 1880; the New Rathaus, post-office, Imperial Bank, law courts, Central Railway Station, the large cattle market, and the castle. The city owns its water, gas, and electric works, maintains a municipal pawnshop, and is governed by a municipal council of 18 members and an executive board of 25. It is the seat of government of the district. Its educational institutions include, besides the Royal Gymnasium, two high schools and schools for all the technical branches, one being supported by the town, in addition to some eighteen elementary schools. There is also a municipal library of over 30,000 volumes, and a theatre. Chemnitz is known for its textile products, including cotton, linen, and woolen goods, especially cotton hosiery. The manufacture of locomotives and machinery of all kinds is another very important industry. Its position at the junction of several railway lines adds to its commercial importance. It is the seat of an American consulate. Population, in 1890, 139,000; in 1900, 207,000.

History.—Chemnitz was originally a settlement of the Wends; but the present town grew up around a Benedictine monastery which Emperor Lothair founded in 1125. By 1300 it had a fully organized communal government, and in 1494 it received municipal rights. The industrial history of the town begins in the Thirteenth Century, when it possessed extensive bleacheries. In the Thirty Years' War Chemnitz was laid waste; but later in the century the introduction of cotton manufacturing revived its prosperity.

CHEMNITZ, kĕm'nĭts, **KEMNITZ, CHEMNITIUS,** Martin (1522-86). Next to Luther and Melanchthon the most distinguished German Protestant theologian of the Sixteenth Century. He was born at Treuenbrietzen, in Brandenburg, November 9, 1522; studied at Frankfort-on-the-Oder and Wittenberg; and in 1548 became rector of the cathedral school of Königsberg. About 1550 he began to devote himself seriously to theology, and in 1553 went back to Wittenberg, where he became familiar with Melanchthon and delivered prelections on *Loci Communes*, whence sprang his own *Loci Theologici*, which for method and learning excels all similar books of the same age. In 1554 he was made a preacher in Brunswick, where he wrote his *Repetitio Sanæ Doctrinæ de Vera Præsentia Corporis et Sanguinis Domini in Cœna Sacra* (1561), in which he defended Luther's view of the Lord's Supper against that of the Swiss reformers; the *Theologiæ Jesuitorum Præcipua Capita* (1562); and the *Examen Concilii Tridentini* (4 vols., 1565-73), a work in which he argued with remarkable acuteness and learning against the dogmas of the Church of Rome. His *Corpus Doctrinæ Prutenicum* (1566), written in conjunction with Joachim Mörlin, became a standard work of divinity among the Prussian Protestants. But his greatest ecclesiastical achievement was inducing the Saxon and Swabian churches to adopt as their confession of faith the *Concordienformel*, and thus extending and consolidating the creed of Luther. He died in Brunswick, April 8, 1586. For his life, consult C. G. H. Lentz (Gotha, 1866).

CHEMNITZ, Matthäus Friedrich (1815-70). A German poet, born in Barmstedt, Holstein. For a number of years he was editor of the *Hamburger Nachrichten*. He is best known as the author of "Schleswig-Holstein meerumschlungen," which, as set to music by Bellmann, was extremely popular throughout Germany, particularly in 1848-49 and 1863-64.

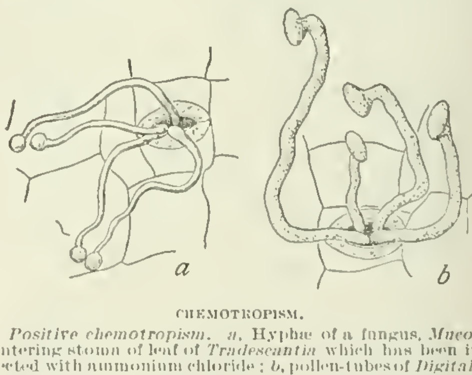
CHEMNITZER or **KHEMNITZER,** kĕm'nĭt-sĕr, Ivan Ivanovitch (1745-84). A Russian fabulist, born at Yenotayevsk, Astrakhan, the son of a German physician of Chemnitz, who had served in the Russian Army under Peter the Great. He participated in the campaigns of the Seven Years' War and afterwards devoted himself to mining engineering, and subsequently visited Germany, Holland, and France. Upon his return he accepted a position as consul to Smyrna, where an attack of melancholia hastened his death. In contradistinction to Sumarokoff and others among the earlier fabulists of Russia, whose works are essentially satires, Chemnitzer was the first to introduce the genuine fable into Russian literature. Although to some extent translations or imitations of La Fontaine and Gellert, his works show considerable originality, and their good-humor, vivacity of dialogue, simplicity, and distinctively national character have greatly endeared them to the Russian people. The latest and best edition of his works is that of Grot (Saint Petersburg, 1873).

CHEMOSH, kē'mōsh. The national god of the Moabites, mentioned as such in the Bible (Num. xxi. 29; Jer. xlviii. 46) and on the Moabite Stone. He bears the same relation to the Moabites as the national deity Yahweh does to the Hebrews. Little is known of the worship of Chemosh; the Moabite Stone tells that Mesha, King of Moab, built a high place for the worship of his god; and when Solomon, as a political symbol of his control over surrounding nations, introduced the official cults of other deities by the side of the national Yahweh, he also built a high place in Chemosh's honor. From the fact that the King of the Moabites offered up his son to the god (II. Kings iii. 27), it has been conjectured that human sacrifices formed part of the worship of Chemosh. The Amorites are apparently said to have worshiped Chemosh (Judges xi. 24), but the passage (Judges xi. 12-28) in which this statement occurs is probably an interpolation, and should refer to Moab. Chemosh was formerly variously identified with Saturn or Mars, but these identifications have no value. The etymology of the name is not known.

CHEM'OTAX'IS (Neo-Lat., from Gk. χημεία, *chēmeia*, alchemy + τάξις, *taxis*, arrangement, from τάσσειν, *tassein*, to arrange). The sensitiveness of free-swimming organisms to certain chemical substances, by virtue of which they approach or recede from the source of the substance. Chemotaxis seems to be fundamentally the same as chemotropism (q.v.), though the reaction is unlike. It has been held that in many organisms the unequal stimulation of different parts of the creature by the diffusing chemical substance causes the motor organs on one side to act more strongly than those on the other. Thus, the body is swung around in the medium until it is so placed that all sides are equally stimulated. This condition occurs only when the axis of the organism coincides with some of the lines of diffusion of the stimulating chemical compound. Since the motor organs still act, but now equally on all sides, swimming must take place either toward or away from the source of diffusion. More recent study, however, has shown that with certain substances the organisms, swimming in all directions, accidentally pass into the constantly increasing sphere of influence of the diffusing substance; but as they swim through it, reach the limit, and are about to pass out into the pure solvent again, a reaction occurs which reverses the movement of the motor organs. The creatures thus seem to rebound from the invisible limit whenever they reach it. The region occupied by the diffusing substance therefore acts as a trap into which they may pass but from which they cannot escape. Other substances repel a given organism. In this case the reversal of motion occurs as soon as they reach the boundary of the region occupied by the diffusing particles.

Chemotactic sensitiveness is observed, among plants, in zoöspores of various algæ and fungi, in sperms of mosses and ferns, and in many bacteria. Fern-sperms are attracted by malic acid and its salts, as well as by many salts of the common mineral acids. Sperms of mosses are attracted by cane-sugar. Such reactions may be demonstrated as follows: Very fine capillary glass tubes are prepared, of such diameter that the sperms can swim easily into them. These are cut into lengths of about one centimeter, and one end of each is sealed in the flame. These tubes are submerged in the solution to be tested, and the whole is exhausted of air under an air-pump. Air is then allowed to reënter the receiver, and the fluid is forced into the tubes, leaving only a small bubble of air at the closed end. A drop of water containing the sperms is now mounted on a microscopic slide in the ordinary way. The tubes just described are placed under the edges of the cover-glass, their open ends inside. After a short time the sperms may be observed swimming toward and into the tubes, or away from them. The mode of response of an organism is profoundly influenced by the concentration of the substance.

CHEMOT'ROPISM (from Gk. χημεια, *chēmeia*, alchemy + τροπή, *tropē*, a turning, from τρέπειν, *trepein*, to turn). The sensitiveness of certain plant-organs by virtue of which they change the direction of their growth when acted upon by chemical substances. If an organ bends so as to grow toward the source of a substance, it is said to be positively chemotropic to that substance; if it turns away from it, it is negatively chemotropic. The organ tends to place itself so that it shall be equally stimulated on all sides by the diffusing chemical substance. In elongating organs, such as roots, fungous filaments, etc., the reaction is one of growth; the curvature is brought about either by the retardation of growth on one side or by its acceleration on the other, or by both together. Of course the



CHEMOTROPISM.

Positive chemotropism. *a*, Hyphæ of a fungus, *Mucor*, entering stoma of leaf of *Tradescantia* which has been injected with ammonium chloride; *b*, pollen-tubes of *Digitalis* entering stoma of same, injected with 4 per cent. solution of cane-sugar. (After Miyoshi.)

side on which retardation occurs becomes concave; the opposite side convex. If a root is positively chemotropic toward a substance, that side which comes in contact with the most of the substance — as the latter diffuses through the medium in which the root is growing—will be retarded in growth and become concave. If the root is negatively chemotropic, acceleration of growth will take the place of this retardation, and that side will become convex. Thus the root-tip is turned either toward or away from the source of the diffusing compound, and the bending continues until all sides are equally stimulated. What the mechanism of this response is has not been made out. It is probable that the difference in absorption of the stimulating substance on the two sides is accountable for the change in growth, but further than this we cannot go. The reaction is seen in case of many gases, liquids, and solids when dissolved in water. The term aërotropism (q.v.) has been applied to the power of responding to gases in this way. A good example of chemotropism is furnished by the following: If fungi be grown in a plate of moist gelatin, and an excess of sugar be added to a certain part of the gelatin plate, the filaments will bend and grow from all parts of the medium toward the part which is richer in sugar. The diffusion of the sugar from this region out into the surrounding material is the occasion of the response. Also, certain fungi which grow upon decaying meat (e.g. Saprolegnia) are similarly attracted by meat extract. Another example occurs in the fly-eating sundew (*Drosera*). The tentacles upon its leaves exhibit chemotropism toward nitrogenous compounds and toward ammonium phosphate to a very marked degree.

CHEMULPO, Korean seaport. See KOREA.

CHEMUNG (shê-mŭng') **GROUP.** A series of sandstones and shales of marine origin, constituting the uppermost member of the Devonian system in southern and western New York and eastern Pennsylvania, and deriving its name from the Chemung Narrows, near Elmira, N. Y., where the formation was first described. The Chemung group formed the top of the 'New York system' of the early New York State Geological Survey. It succeeds the Portage group, which it conformably overlies, and which it resembles in the shallow-water character of most of its deposits. The rocks are mostly shales, though sandstones are frequent, and a pudding-stone bed, known as the Panama Conglomerate, occurs in the western part of New York, at a horizon about 250 feet below the top of the group. In the vicinity of its original locality, near Elmira, the Chemung group has a thickness of about 1500 feet; it thins westward toward the Pennsylvania-Ohio line, where it disappears. Toward the east it changes its character, the marine deposits giving way to the estuarine and brackish-water deposits of its littoral facies, the Catskill group (q.v.). Southward, through eastern Pennsylvania, the thickness of the marine deposits increases, and along the northern Appalachian Mountains the group is from 3500 to 5000 feet thick. Its southward continuation below Pennsylvania has not been well determined.

The Chemung rocks, as a rule, abound in fossil contents. Brachiopods are most abundant, in places forming whole layers of rock, where the shells were washed together by currents and strewn over the shallow bottoms. Land plants, prophetic of the forms seen in the later coal-measures, are common in the more easterly portions of the formation, especially in the estuarine beds of the Catskill series, where a large fern, Archæopteris (q.v.), is often found. At several localities in western New York have been found large numbers of Dictyospongidæ (q.v.), allies of, and probably when alive just as beautiful as, the modern glass-sponge (*Euplectella*). The characteristic fossils are: Brachiopods—Spirifer disjunctus, Atrypa hystrix, and A. spinosa, Rhynchonella contracta, Productella lachrymosa; Pelecypods—Pterinea chemungensis, Grammysia subarcuatus, Prorhynchus nasutum, Schizodus chemungensis. Some phyllocarid crustacea have been found, and in a few localities 'fish-beds' have yielded good examples of Holoptychius, Bothriolepis, etc. The economic products of the Chemung consist of building-stone, and oil and gas in the western counties of New York.

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CHE'NA (Hind.). The Hindu name of the most common and widespread species (*Ophiocephalus striatus*) of the 'walking' or serpent-headed fishes. See WALKING FISHES.

CHENAB, chê-näb' (Pers., gathering of waters). The largest of the five rivers which give name to the Punjab (q.v.), British India (Map: India, B 2). It rises at an altitude of 14,000 feet above the sea in the western Himalayas, flows through the Ritanka Pass, and, after a southwest direction, enters the plains of the Panjab, at Riasi. It receives from the right the Jhelam, and from the left the Ravi and the Ghara, with its affluents, the Sutlej and the Beas. After its junction with the Ghara, near Uchh, it assumes the name of the Panjnad (five rivers), and flows into the Indus, near Mithankot. Its length is about 750 miles. In the lower part of its course it is from a half-mile to one mile in breadth. It is navigable by rafts 50 miles below Riasi.

CHENAVARD, shä'nä'vär', PAUL JOSEPH (1808-95). A French historical painter, born in Lyons. He was a pupil of Ingres and Delacroix, and began for the Panthéon a series of historical frescoes, interrupted by the reversion of the structure to the Church. Such portions as were executed are now in the Museum of Lyons. His other works include "Death of Cato and of Brutus." Consult Silvestre, "Etude sur Paul Chenavard," in his *Histoire des artistes vivants* (Paris, 1855-56).

CHE'NERY, Thomas (1826-84). An English journalist and Arabic scholar. He was born in the Barbadoes, was educated at Cambridge, and became correspondent for the London *Times* in the Crimean War. Afterwards he became a writer of editorials, and in 1877 succeeded John T. Delane as editor of the *Times*. He was an excellent Arabic and Hebrew scholar; was professor of Arabic at Oxford from 1866 to 1877; and was a member of the company of the Old Testament revisers. He published a translation of the *Six Assemblies* of Hariri (1867), and an edition of the *Machberoth Ithiel* of Harizi (1872).

CHE'NEY, Charles Edward (1836—). A bishop of the Reformed Episcopal Church in America. He was born in Canandaigua, N. Y., and graduated at Hobart College in 1857, and two years later at the Theological Seminary of Virginia. He was ordained to the Protestant Episcopal priesthood, and in 1860 became rector of Christ Church, Chicago. For refusing to use the word 'regenerate' in the baptismal offices, he was tried and suspended by an ecclesiastical court, and when he refused to yield was deposed from the priesthood. Soon afterwards (in December, 1873) he was chosen assistant bishop, and afterwards bishop, of the Reformed Episcopal Church, then newly organized, and became again rector of Christ Church, Chicago, the parish following its pastor into the new communion.

CHENEY, John Vance (1848—). An American librarian and poet, born in Groveland, N. Y. He studied law in Woodstock, Vt. (1871-74), and in Haverhill, Mass. (1874-75), and practiced for a year in New York. He then removed to California (1876), and was librarian of the Free Public Library in San Francisco from 1887 to 1894. Since 1894 he has been librarian of the Newberry Library in Chicago. He has published several volumes of poems, including: *Thistle Drift* (1887); *Queen Helen, and Other Poems* (1895); *Out of the Silence* (1897); and *For Thinking Hearts* (1901); and two volumes of essays: *The Golden Guess* (1893), and *That Dome in Air* (1895).

CHENEY, Seth Wells (1810-56). An American artist. He was born in Connecticut, studied art in Paris, and became famous for his crayon portraits, those of Theodore Parker and William Cullen Bryant being especially well known. To him is attributed the beginning of crayon work in the United States. His widow, Ednah Dow Cheney (1824—), became a well-known author. She took an active part in the Freedman's Aid movement, and was later a prominent advocate of woman suffrage.

CHÉNIER, shā'nyā', André Marie de (1762-94). A French poet. He was born in Constantinople, where his father, Louis de Chénier, a historian of some note, was consul-general. André was sent in infancy to France, and studied in Paris. His mother was Greek, and he had a strong predilection for Greek poets, from whom he adapted verses as early as 1779. In 1782 he entered the army, but resigned that year and gave himself up to study and poetry, writing idyls and planning longer works. His health failed from overstudy, and he passed 1785-86 in travel. On his return he conceived a passion for Madame de Bonneuil that inspired many of his elegies, remarkable for their classic purity of language and their restrained vigor of thought, and showing him an apt, probably the aptest, pupil of the Greek anthologists. He wrote also at this time, in imitation of Ovid, a poem on the "Art of Love;" a poetic theory of æsthetics, "L'Invention;" and a Lucretian philosophic poem, "Hermes," which remains a noble fragment, but "Susanne," a Miltonic treatment of the biblical legend, is little more than a preliminary sketch. None of this work was then published. In 1787 Chénier went as secretary of legation to London. This uncongenial post he resigned in 1790, and entered with patriotic zeal into the revolutionary movement, joining the moderate party as a lover of liberty and a hater of anarchy. He wrote a manifesto in this spirit for the Society of '89, which brought him a medal from Stanislas Poniatowski of Poland and fierce denunciation from Camille Desmoulins, in *Les révolutions de France et de Brabant*. In 1791 he wrote the *Jeu de Paume*, a superb Pindaric ode on the meeting of the Third Estate. The same year he was defeated in the election for the National Assembly. In 1792 his anti-Jacobin attitude involved him in sharp controversy, and the fall of the monarchy made him resolve to retire from politics and devote himself to study and art.

But the trial of the King brought him again to the front. He offered to share in the preparation of the King's defense and in the responsibility for it. Then, broken in spirit, he withdrew to Rouen and Versailles, whence he wrote the striking poems, "A Versailles" and "A Fanny." He could not resign himself to be a passive spectator of the Terror. On January 6, 1794, seized for protesting against the arrest of his hostess, Madame de Pastoret, at Passy, he remained in Saint-Lazare prison till his execution, July 25. Here he wrote his most famous poems, an iambic denunciation of the Convention, and the exquisite "Jeune Captive," dedicated to his fellow-prisoner, Mademoiselle de Coigny (later Duchess of Fleury). It is said that on his way to execution he recited to his fellow-condemned, the poet Roucher, the opening lines of Racine's *Andromaque*. His last words are reported as: "I have done nothing for posterity, and yet I had something in me." He had indeed published only the "Jeu de Paume" and "Ode à Charlotte Corday," the self-appointed executioner of Marat. His other poems were first edited in 1819, by Latouche. He became at once a restraining and chastening force in the new romantic poetry. He still stands among French poets as an envied model of formal purity, stately yet vigorous diction, and a lyric style that is warmly passionate, yet never obtrusively personal. The best edition of Chénier is by Becq de Fouquières (3 vols., 1862), who also published (1840) *Nouveaux documents sur André Chénier, Œuvres en prose*. There is also a later edition of Chénier's *Prose* (1879) and *Poésie* (1889), by L. Moland. Consult: Becq de Fouquières, *Lettres critiques sur Chénier* (Paris, 1881); Vallée, *Chénier et les Jacobins* (Paris, 1881); Ronquet, *Les Chénier, portraits, lettres et fragments inédits* (Paris, 1891); Bertheleroy, *Eloge de Chénier* (1901); Haraszti, *La poésie d'André Chénier* (Paris, 1892); Morillot, *André Chénier* (Paris, 1894); Heller, *André Chénier* (New York, 1895).

CHÉNIER, Marie Joseph de (1764-1811). A French poet and dramatist, the younger brother of André Marie de Chénier. He was born in Constantinople, was educated in France, and entered the army at seventeen, but soon left it, and at twenty produced *Azémire* (1784), a rather feeble tragedy. His *Charles IX.*, however, excited in 1789 intense enthusiasm, its intrinsic merit being supplemented both by the occasion of the eve of the Revolution and by the genius of the great actor Talma, who achieved in it his first renown. This play is still acted. Other dramas, now forgotten, followed—*Henri VIII.* and *Jean Calas* in 1791, *Caius Gracchus* in 1792. This last was proscribed for its anti-Jacobin phrase, 'Laws and not blood,' as was his *Timoléon* in the following year. He now became, as member of the Jacobin Club, a literary politician and political poet. He was successively member of the Convention, the Council of Five Hundred, the Tribunate, and of the Committees of Public Instruction, General Security, and Public Safety. Under Napoleon he was member of the Educational Jury of the Seine, and member of the Committee of Public Instruction (1803-06). He lectured on literature under imperial patronage, and wrote, at Napoleon's command, a good *Tableau historique des progrès de la littérature française* (1808), that has been often reprinted. His most noteworthy poems are the national song, the *Chant du départ*; *Sur la mort de Mirabeau*; and *Sur l'oligarchie de Robespierre*. His best satires are the *Lettre à Voltaire* (1806), and the well-named *Epître sur la calomnie* (1797), which may seem to illustrate the vice it denounces. Chénier also deserves remembrance for his work as translator, not only from the Latin and Greek poets, but from the German Lessing and the English Gray. Chénier's *Works* are collected in eight volumes (1823-26). His poetry is separately printed (1844).

CHENILLE, shė-nēl' (Fr., caterpillar). A thick, velvety, tufted cord of silk, wool, or worsted, having short fibres or threads standing out at right angles from a central core of thread or wire, and so bearing some resemblance to a woolly caterpillar. It is made by weaving four warp threads, or crossing three warp threads about filling threads that are afterwards cut; and is used in trimming and bordering dresses, in ornamental sewing, and in manufactured trimmings. In certain kinds of carpet, chenille is used instead of yarn to form the filling. (See Carpet.) In embroidery also chenille is employed, being either laid on the surface of the stuff or drawn through with a needle. Chenille is used also in combination with wool or cotton in the manufacture of a cloth known as *chenille cloth.*

CHENNEVIÈRES - POINTEL, shȧ-nĕv'yâr' pwăN'tĕl', Charles Philippe, Marquis de (1820—). A French administrator and art critic, born at Falaise. In 1851 he received the title of inspector of museums of the provinces, and in 1855 was chosen inspector-general of exhibitions of art, and was further given charge of the organization of the Salon at the Palais de l'Elysée. He was also made manager of the Luxembourg Museum, and in 1873 director of fine arts. In 1874 he instituted a *prix du Salon*, whose recipient was given the opportunity to spend three years in study in Rome. In this capacity he had the choice of artists and subjects for the decoration of the Panthéon. His interest in things artistic included making the teaching of drawing obligatory in the common schools of France. Among his numerous works on art and kindred subjects are: *Lettres sur l'art français* (1851); *Notice historique et descriptive sur la galerie d'Apollon au Louvre* (1851); *Portraits inédits d'artistes français* (1853); *Les derniers contes de Jean de Falaise*, his own nom-de-plume (1860).

CHENONCEAUX, shė-nôN'sō'. A celebrated castle in the Department of Indre-et-Loire, France, built on piles in the river Cher, four miles east of Bléré. Its foundations were laid in 1515. It became Crown property in 1535, and was a favorite occasional residence of Francis I. Henry II. presented it to the celebrated Diana of Poitiers, who lavished much money on its embellishment, as did also Catharine de' Medici, after she had dispossessed Diana. Among the curiosities shown to the visitor is the mirror used by Mary Stuart, Queen of Scots, during her honeymoon spent at Chenonceaux with Francis II. in 1559. The castle became private property in the Eighteenth Century, and was long an attractive resort for the distinguished literary and scientific men of that period, including Montesquieu, Voltaire, Fontenelle, Buffon, Bolingbroke, and Rousseau. It escaped the ravages of the revolutionary period, and is in a fine state of preservation.

CHENOPODIACEÆ, kē'nō-pō'di-ā'sė-ē (Neo-Lat. nom. pl., from Gk. χήν, *chēn*, goose + πούς, *pous*, foot). An order of dicotyledonous plants, consisting of herbs and half shrubs, with entire or divided leaves that are destitute of stipules. The flowers are inconspicuous, hermaphrodite, or unisexual: the perianth deeply divided, persistent: the stamens inserted into its base, opposite to its segments, and equal to them in number, or fewer: the ovary single, free, or occasionally adhering to the tube of the perianth, with a single ovule attached to the base of the cavity: the style generally with two to four divisions. The fruit is membranous, inclosed in the perianth, which sometimes becomes fleshy. The seed has a curved or spiral embryo. There are about seventy-five genera and five hundred known species, most of which have a weed-like appearance and grow in waste places. They are widely diffused over the world, but are particularly abundant in the northern parts of Europe and Asia. Beet and spinach are among the best known and most useful plants of the order. Many are occasionally used as pot-herbs, as some species of Chenopodium and of Orache. The fruit of the strawberry blite (*Blitum capitatum* and *Blitum virgatum*), a common weed in the south of Europe, resembles the strawberry, and has a sweetish, insipid taste. It is also indigenous in America. The seed of quinoa (q.v.) is used for food as a kind of grain. Some members of the order are aromatic. See Chenopodium.

As most of the species of this order frequent situations where the soil abounds in salt, necessitating a reduction of transpiration by the plant, many curious devices to prevent too abundant giving off of water are shown. In Salicornia the leaves are wholly suppressed, and the stem is curiously jointed. In many others the leaves are covered with peculiar scales or hairs, giving to the plant a mealy appearance, and structural differences are also present by which water is kept within the plant, so that there is not such a draining of the soil and consequent absorption of salt as would be expected in plants growing in salt marshes, etc. Two great groups are formed of the genera—the Cyclolobeæ, in which the embryo is ring-shaped, or horseshoe-shaped, and Spirolobeæ, in which the embryo is spirally coiled. Beta, Chenopodium, Spinacia, Atriplex, Kochia, Corispermum, and Salicornia belong to the first group, and Sarcobatus, Sueda, and Salsola to the last.

CHENOPODIUM, kē′nō-pō′dĭ-ŭm (Neo-Lat., from Gk. χήν, *chēn*, goose + πούς, *pous*, foot). A genus of plants of the order Chenopodiaceæ, some species of which are well known by the name of goosefoot, as weeds in gardens, on heaps of rubbish, and in waste places. The species are mostly annuals, with entire or toothed leaves, which in some cases have a sort of mealy hoariness. They are mostly natives of Europe, and of the temperate parts of Asia; but some are natives of America, into which, however, some of the common European species have found their way, and are naturalized as weeds. The genus has hermaphrodite flowers with perianth of five small green scales, five stamens, and solitary flat seeds. The leaves of many species are used as a substitute for spinach, particularly those of the good-Henry, wild spinach, or English mercury (*Chenopodium bonus-henricus*), a perennial plant, native of Great Britain and other parts of Europe, often found growing by waysides, with stem more than a foot high, powdered with minute, transparent globules, and large, alternate, triangular, arrow-shaped, entire leaves. It is cultivated in some places, particularly in Lincolnshire, chiefly for the leaves, but the young shoots are also used as asparagus. *Chenopodium urbicum*, *Chenopodium album*, etc., annuals common in waste places, are also excellent substitutes for spinach. *Chenopodium olidum* and *Chenopodium vulvaria* (stinking goosefoot), annuals with an extremely nauseous odor, growing in waste places in Great Britain and elsewhere, especially near the sea, are popular medicines, in much repute as antispasmodics and emmenagogues. *Chenopodium botrys*, a native of the south of Europe, with pinnatifid leaves resembling those of the oak, and hence called Jerusalem oak, is in use as an expectorant and anthelmintic. It is not fetid like the species last named, but agreeably fragrant. *Chenopodium ambrosioides* has a strong aromatic odor, is used in Mexico instead of tea, and is much cultivated in France, an infusion of it being deemed useful in nervous disorders. The same species, known in the United States as wormseed, has a strong and somewhat aromatic odor, and enjoys a high reputation as a vermifuge. Its seeds are chiefly used, or the essential oil extracted from them, called oil of wormseed. More important than any of these species, as affording an important article of food in the countries of South America, of which it is a native, is quinoa (*Chenopodium quinoa*), the seeds of which are large and abundant and are extensively used. The coast blite (*Chenopodium rubrum*) and the strawberry blite (*Chenopodium capitatum*, formerly known as *Blitum maritimum* and *Blitum capitatum*) are indigenous species along the seacoast, about the Great Lakes and westward.

CHENU, she-nụ′, Jean Charles (1808-79). A French naturalist and army physician. He was born in Metz, and was educated in Paris. In 1829 he entered the sanitary corps of the army, and subsequently he was a physician in the Crimean War. During the Franco-Prussian War he was at the head of the ambulance corps of the Paris press. In addition to publishing several valuable works on the medico-surgical statistics of modern French campaigns, he edited the colossal publication entitled, *Encyclopédie d'histoire naturelle* (31 vols., 1850-61).

CHEOPS, kē′ŏps. The name under which the second King of the Fourth Egyptian dynasty, who built the greatest of the pyramids, near Ghizeh, is generally known. In that form the name is given by Herodotus. He is called Chembes by Diodorus, Saophis by Eratosthenes, and Souphis by Manetho; the hieroglyphic form is Khufu. He carried on successful wars against the Bedouins of the Sinai Peninsula. Among the Greeks many fables concerning his wickedness, his repentance, and the prostitution of his daughter to gain money for his pyramid, were current. The Egyptians, however, considered him a wise and powerful ruler, and to him the foundation of many temples was ascribed. Various monuments bearing his name have survived; outside of Egypt there have been discovered only the inscriptions at Wady Magharah, near Sinai, where the old copper-mines were worked, under him, by the Egyptians. For an account of his reign, see Egypt; for a description of his tomb, see Pyramids.

CHEPHREN, or **KHEFREN**, kĕf′rĕn. A King of Egypt, the builder of the pyramid near Ghizeh, second in size of the great pyramids. The usual form of his name is taken from Herodotus; other Greek writers call him Chabyras (Diodorus), Souphis (Manetho), Saophis (Eratosthenes). In Egyptian his name is Kha'-f-re'. The Greeks, misled by the similarity of the two names, commonly call him the brother of Cheops; but, according to Egyptian tradition, he was his son. The famous Sphinx near the pyramids was attributed to Chephren as early as about B.C. 1450, but whether correctly is much disputed, as is also the question as to whether the magnificent statues of Chephren found in a neighboring pit were erected by that King himself or by worshipers of a later period.

CHEPSTER. A name used in England to designate the starling (q.v.).

CHEPSTOW, chĕp′stō. A market-town and river port of Monmouthshire, England, on the Wye, about 15 miles east-northeast of Newport (Map: England, D 5). It lies between bold cliffs, on a slope rising from the river, in the midst of beautiful scenery. Its castle, dating from the Thirteenth Century, is well preserved. The river is notable for its high tides, which reach at times the height of 50 feet. In the neighborhood are the fine ruins of Tintern Abbey and Caldicot Castle. Population, in 1891, 3400; in 1901, 3000. Consult: Wakeman, "The Town and Castle of Chepstow," in *British Archæological Journal*, Vol. X. (London, 1855); Marsh, *Annals of Chepstow Castle* (Exeter, 1883).

CHEQUE, chĕk. See Check.

CHER, shâr (Gall. *Carus*, connected with Bret. *quer*, Lat. *carus*, dear). A tributary of the

Loire, rising near Crocq, in the Department of Creuse, France (Map: France, H 4). It flows in a tortuous course for 200 miles, in a general northwest direction, until it joins the Loire below Tours. It is navigable to Vierzon, 47 miles from its mouth.

CHER. A central department of France, to which the river Cher gives its name. The surface is mostly level, traversed by well-wooded elevations, and produces corn, fruits, wine, hemp, flax, etc. The climate is mild and pleasant. Area, 2700 square miles. Population, in 1896, 347,393; in 1901, 342,889. Capital, Bourges.

CHERASCO, kâ-räs′kô. A city in north Italy, 36 miles south of Turin, near the confluence of the Stura and the Tanaro (Map: Italy, B 3). It has a domed church, two triumphal arches, a gymnasium, and a technical school, markets grain, wine, and truffles, and manufactures silk. The fortifications that made Cherasco important in the Middle Ages were destroyed by the French in 1801. The Peace of Cherasco in 1631 ended the Franco-Austrian War, and in 1796 the armistice of Cherasco was followed by the treaty in which the King of Sardinia ceded Savoy and Nice to France. Population, in 1881 (commune), 9000; in 1901, 9054.

CHERASKOV, kâ-räs′kôv, MIKHAÏL MATVEYEVITCH. See KHERASKOFF.

CHERAW, chē-ra̤′. A town in Chesterfield County, S. C., 140 miles north of Charleston, on the Pedee River, and on the Seaboard Air Line and the Atlantic Coast Line railroads (Map: South Carolina, E 2). It has some industries, the most important of which are a canning factory and planing and veneering mills. During the Civil War Cheraw was for a time a depot of supplies for the Confederates. General Sherman captured it on March 3, 1865, and destroyed an immense amount of stores, including 3600 barrels of gunpowder. Population, in 1890, 976; in 1900, 1151.

CHERBOURG, shâr′bo͞or′. A fortified seaport town and arsenal of France, in the Department of Manche, at the mouth of the Divette River and at the head of a deep bay on the northern extremity of the peninsula of Cotentin, on the English Channel (Map: France, E 2). Among its prominent buildings are the Church of Sainte Trinité (Fifteenth Century), lately restored, in front of which is a bronze statue of Napoleon I.; that of Saint Clement; the Hôtel de Ville; the marine library, containing 25,000 volumes; the museum and theatre. It owes its importance to its defensive and naval works. Napoleon I. began to build the great defenses of this northern stronghold of France. His nephew, Napoleon III., developed his plans, but not with the original view of an invasion of England. Occupying a prominent position on the French coast, only some 60 miles removed from the southern shore of England, the harbor works have been extended, strengthened, fortified, and provided with cannon, the dockyards improved, and facilities of embarkation afforded. The vast breakwater of Cherbourg incloses a space of nearly 2000 acres. In connection with its fortifications, this breakwater assumes an importance that attaches to no other work of the kind in existence. At the apex of the angle formed by the meeting of the two branches of the breakwater, or *digue*, there is a central fort or battery, measuring 509 feet on the inner line of the parapet, which forms a flat semi-ellipse. The circular forts at the extremities of the breakwater are remarkably well placed for purposes of defense. Behind the centre battery there is an elliptical tower, measuring 225 feet on the major and 123 feet on the minor axis. The entrances to the harbor are around the end of the mole; and the passages are further defended by the fortifications of the Ile Pélée, and by the batteries of La Roche Chavaignac and Fort Querqueville. A series of coast redoubts, and the two large fortifications of Les Roches des Flamands and du Homet, are situated behind this outer zone of defense. Besides batteries on the mole, Cherbourg is defended by many regular forts and redoubts. The town itself is commanded by the towering fort and mountain of La Roule, and Fort d'Octeville, on the heights behind. The military port of Cherbourg comprises a small outer harbor the entrance to which is 206 feet wide at its narrowest point. This harbor communicates by means of a lock with a floating basin, 957 feet long by 712 feet wide. The outer harbor has four building slips for first-class ships, besides some smaller slips and a fine graving-dock. In August, 1858, an inner floating harbor was opened. This harbor, entirely cut out of solid rock, has a length of about 930 yards and a breadth of 437 yards, and is surrounded by building slips and capacious graving-docks. Cherbourg has a safe and commodious commercial port quite distinct from the other, situated on the southeast. Among its numerous industries are ship-building, sugar-refining, lace-making, tanning, and dyeing. The United States is represented by a consular agent. Population in 1901, of town, 36,326; of commune, 42,938.

Cherbourg is a town of Gallic origin, and is identified with the Roman *Coriallum*. In the Hundred Years' War it was captured by the English (1418) after a siege of four months, but was regained by Charles VII. in 1450, after which it remained in the hands of the French. Louis XIV. attempted to make it a military fort, but the works were dismantled in 1689. In 1758 the English inflicted severe damage upon the fortifications. On June 19, 1864, the Confederate cruiser *Alabama* steamed out of Cherbourg Harbor to meet the Federal war-ship *Kearsarge*, and during the historic fight that ensued was destroyed about nine miles from the harbor.

CHERBULIEZ, shâr′bụ′lyâ′, ANTOINE ELISÉE (1797-1869). A Swiss political economist and jurist, professor of economics in Geneva and afterwards in the National Polytechnic School in Zurich. He was a contributor to cyclopædias and periodicals, and the author of *De la démocratie en Suisse* (1845); *Le socialisme c'est la barbarie* (1848); and *Précis de la science économique* (1862).

CHERBULIEZ, shâr′bụ′lyâ′, CHARLES VICTOR (1829-99). A cosmopolitan French novelist, son of a professor in Geneva, where he was born, and where he studied history and philosophy, as well as in Paris, Bonn, and Berlin. He taught, and then traveled widely, gathering material that he afterwards used in social and political essays, and also in his novels. Of his writings the first, *A propos d'un cheval* (1860), was archæological; others were scientific. He first caught popular favor by *Le comte Kostia* (1863). The best of a multitude that followed in quick succession are: *Prosper Randoce* (1868); *Ladislas Bolski* (1869); *Miss Rovel* (1870); *Meta Holdenis* (1873); and *Samuel Brohl et Cie.* (1877). He is best in cosmopolitan characterizations of Russians, Poles, English, Germans, or Jews—persons of exaggerated independence, incoherent and improbable as the plots in which they figure. Cherbuliez's descriptions are varied and clever, but superficial; his psychology is weak and conventional; the story may be interesting, but the ending is apt to be trivial. He grazes burning questions of sociology or science, deftly adapting his treatment to currents of popular interest, and with a sharp, cynical, and rather narrow irony. Cherbuliez became an Academician in 1881. Most of his novels have been popular in English translations. His essays, under the assumed name of G. Valbert, are in part collected, under various titles, and deal with politics, literature, and art. Consult the *Eloge*, by E. Faguet, on his succession to Cherbuliez's seat in the French Academy.

CHERET, she-râ′, JULES (1836—). A French artist, born in Paris. He was the first to take up and make an art of poster designing. In 1866 he set up his own printing establishment in Paris, and printed the first posters in color. This establishment was afterwards acquired by the Maison Caix (1881). With very simple means he accomplished a most artistic effect, and his original and charming work opened a new field for artists. Jules Cheret's posters were catalogued by M. Biraldi, and number more than 500. The finest of them is the "Fêtes de Mont-de-Marsan."

CHERETHITES AND PELETHITES, kĕr′ê-thīts, pĕl′ê-thīts. Two peoples settled in the Negeb of Palestine, and furnishing a bodyguard for David. They are mentioned together in II. Sam. viii. 18; xv. 18; xx. 7. 23; I. Kings i. 38, 44; I. Chron. xviii. 17. In all these passages the troops are referred to. The Cherethites alone are mentioned in I. Sam. xxx. 14; Zeph. ii. 5; Ezekiel xxv. 16; and probably Ezekiel xxx. 5. The Greek and Syriac versions translate Cherethim as 'Cretans,' and they are evidently regarded as belonging to the Philistines. The Pelethites are probably only a dialectical pronunciation of Philistines. There is nothing improbable in David's having a bodyguard made up of Philistines. Possibly the Cherethites were more closely related to the Eteo-cretans than were the Pulsta, or Philistines.

CHERIBON, shĕr′ĭ-bŏn. The capital of the residency of that name, situated on the northern coast of Java, about 125 miles southeast of Batavia. Although it has lost to a great extent its commercial importance, it still has a considerable trade in coffee, indigo, and teak wood. Population, about 19,000.

CHER′IMOY′ER (Fr. *chérimolier*, corruption of Peruv. *chirimoles*) or CHIRIMOYA (*Anona cherimolia*). One of the most esteemed fruits of Brazil and Peru, now common and even naturalized in some parts of the East Indies and other tropical countries of the Old World, and cultivated upon the Keys of Florida and in California. The tree is from 15 to 30 feet in height, with drooping branches and oblong leaves which are velvety beneath. The fruit is of most delicious flavor, is sometimes described as the finest of all fruits, and sometimes as inferior only to the mangosteen. It belongs to the same genus with the custard-apple (q.v.). Both flowers and fruit emit a pleasant fragrance, but when the tree is covered with bloom the odor is so strong as to be almost overpowering. The fruit varies from the size of an orange to 16 pounds or upward in weight. It is roundish or heart-shaped. Externally it is nearly smooth, greenish or brownish yellow when ripe, and often with a reddish cheek. The skin is rather thick and tough and marked off into pentagonal or hexagonal areas. Internally, the fruit is snow-white and juicy, and contains a number of small brown seeds.

CHĖRKES′SIANS. See CIRCASSIANS.

CHER′NIGOV. See TCHERNIGOV.

CHER′NOZEM (Russ. *chernozemŭ*, from *chernuiĭ*, black + *zemlya*, earth). The Russian name for a very fertile black or dark-colored soil covering the larger part of the southern third of Russia, extending from the southwestern boundaries to the southern half of the Ural Mountains, and reaching beyond the Ural Mountains into Asiatic Russia. The aggregate area of this soil is estimated to be from 216,000,000 to 270,000,000 acres. Soils similar to chernozem are found on the prairies of the western United States and the pampas of Argentina. Typical chernozem is formed by the admixture of humus with loess (qq.v.). The proportion of humus varies from 3 to 10 per cent., the humus containing from 5 to 8 per cent. of nitrogen. Chernozem is rich in plant food, and is of great depth, so that it bears continuous culture with the same crops without deterioration; but its physical properties, due to its very fine particles, are such that under unfavorable weather conditions it loses its normal granular structure, dries out, and becomes so compact as to result in crop failures, followed by the distressing famines which occur occasionally in Russia.

CHER′NYSHEV′SKI. See TCHERNYSHEVSKI.

CHER′OKEE (N. Amer. Indian, upland field). The largest and most important native tribe of the eastern United States. They are of remote Iroquoian affinity, and formerly occupied the mountain region of the Carolinas, Tennessee, Georgia, and Alabama, in numerous permanent villages of substantially built log houses. They depended chiefly upon agriculture, and raised large crops of corn, pumpkins, and beans. De Soto passed through their country in 1540, and for three centuries later they were prominent in the history of the South, taking precedence during the colonial period over all the other tribes of that region. They espoused the British cause during the Revolution, but in 1785 made a treaty of peace with the United States, and at once took up the road to civilization, attaining in a very short time a high degree of prosperity and advancement. This was largely due to the work of devoted missionaries, and to the presence of a respectable mixed-blood element, the descendants of former British traders. In 1820 they adopted the regular civilized form of government, and seven years later formulated a constitution under the style of the 'Cherokee Nation.' In the interval, Sequoya (q.v.), known also as George Guess, had devised for the language an alphabet, which was officially adopted by the Cherokee Government. Within a short time a national press was established, and a considerable body of printed literature appeared in the native language.

Meanwhile, however, gold had been discovered in the Cherokee country, and at once strong pressure was brought to bear to compel the removal of the Indians. Notwithstanding a decision of the Supreme Court upholding the autonomy of the Cherokee Nation, the State of Georgia extended her laws over their country, and President Andrew Jackson refused to interfere in their behalf. Despite the repeated and energetic protests of more than nine-tenths of the Cherokee Nation, a treaty was negotiated with a small faction which bound the tribe to remove within three years beyond the Mississippi, whither a small portion of them had removed some years before. The Cherokees repudiated the instrument, and in 1838 they were removed by military force, several thousands dying on the march or from hardships incident to the removal. Throughout this crisis the great leader of the patriot party was the chief John Ross (q.v.), who served as principal chief of the Cherokee Nation from his first election in 1828 to his death in 1866. On their arrival in the Indian Territory they reëstablished their Government, with Tahlequah as the capital. The outbreak of the Civil War in 1861 brought division to their councils, calamity and misery to their people, the tribe being about equally divided in sentiment, and furnishing large contingents to both the Federal and Confederate forces, each contending army in turn sweeping the Cherokee country until it was left almost a desert waste. At the close of the war they entered into a new treaty with the United States, by which they agreed to free their negro slaves and admit them to full Cherokee citizenship. Since then their history has been chiefly a narrative of successive acts in the hopeless struggle to preserve their national existence from the overmastering grasp of the white man. In 1892 they sold their western territorial extension, known as the 'Cherokee Outlet.' Since then, by rapid successive acts of Congress, their tribal autonomy has been curtailed until hardly more than a shadow remains, and allotment and complete absorption into the white man's government are but a question of a short time. Under their present national Government they have an elective principal chief, a Senate, and a House of Representatives, and a complete system of public schools. The Cherokees of pure and mixed blood, exclusive of adopted citizens and repudiated claimants, may number perhaps 20,000, besides whom some 1400 more, known as the Eastern Band, reside on or adjoining a reservation in western North Carolina, being descendants of those who escaped and fled to the mountains at the time of the removal.

CHÉRON, shā'rôN', ELISABETH SOPHIE (1648-1711). A French artist and poet. She was born in Paris, and at the age of twenty became a member of the Royal Academy of Painting and Sculpture, then presided over by Le Brun. This rare honor for a woman was gained by her remarkable engravings and paintings, already highly esteemed. She was also the author of a poem, *Les cerises renversées* (1717), and a work entitled *Livre de principes à dessein* (1706), containing some of her own engravings. At the age of sixty she married M. Le Hay.

CHERRY (AS. *ciris*, Ger. *Kirsche*, from Lat. *cerasus*, Gk. *κερασός*, *kerasos*, cherry-tree, from *κέρας*, *keras*, horn). Cultivated cherries have sprung almost entirely from two parent species —*Prunus cerasus* and *Prunus avium*—both of European origin. (For illustration, see Colored Plate of DRUPES.) Besides these species, the cherry is represented in Europe, America, Japan, and China by indigenous species, none of which have attained economic importance save the Japanese form (*Prunus pseudocerasus*), in honor of which the famous Cherry Festival is given every year. In America the choke-cherry (*Prunus Virginiana*) has sometimes been cultivated. The bird-cherry (*Prunus Pennsylvanica*) is grown for ornament, while *Prunus Bessii* and *Prunus pumila*, two dwarf forms native to the prairie region of the Northwest, have lately come into notice because of their fruit.

The garden cherries are varieties of either *Prunus cerasus* or *Prunus avium*. To *Prunus cerasus* belong the Morellos and Amarelles—two of the three groups of *sour cherries*, in which the tree characteristics are spreading habit and willowy, drooping branches; to *Prunus avium* belong the Hearts, Bigarreaux, and Mazzards, the *sweet cherries*, and the Dukes, the third group of sour cherries, characterized by tall, robust, upright trees.

The cherry is usually increased by budding the desired variety on Mazzard or Mahaleb stocks. Mazzard stocks are now counted best for both the sweet and sour cherries; but, because buds take more readily on the Mahaleb, this is extensively used as a stock for the sour cherries.

Cherries prefer a well-drained gravelly loam, well enriched with plant food. While they need moisture, they will not tolerate a wet location. The fruit is grown commercially in Europe and the United States. In the eastern United States the sour cherries form an important item in the canning business, while on the Pacific Coast the sweet-cherry industry reaches its highest development.

The fruit of the cherry is much valued as an article of food by the inhabitants of some parts of France, especially by the wood-cutters and charcoal-burners of the forests; and among their modes of preparing it is that of making it an ingredient in soups. It ripens in Norway as far north as latitude 63°. In some parts of Germany the public roads are lined for many miles together with avenues of cherry-trees.

The wild black cherry (*Prunus serotina*) is a splendid timber-tree, the wood being highly prized for finishing and furniture, while the bark is used in medicine and the fruit is used for making brandy.

CHERRY DISEASES. The cherry is subject to a number of fungous diseases, most of which are also common to other fruits, as brown rot (see PEACH), leaf-blight (see PLUM), and black knot (see PLUM). A common disease of the cherry, known as mildew, is caused by the fungus *Podosphæra oxyacanthæ*, which is found upon the apple also, especially upon nursery stock. The affected leaves are gray with the fungus, and they soon dry and fall from the tree. Ammoniacal copper carbonate has been found a very efficient fungicide (q.v.) for preventing it. There is a very common leaf-scorch in Europe due to *Gnomonia erythrostoma*, that has not yet appeared in America. When attacked by this disease the leaves wither suddenly, but remain on the trees all winter. The fruit ripens unevenly, cracks, and rots. In Germany relief was secured by collecting and burning all the leaves for two seasons. To be successful, this would have to be practiced over a considerable area, as the winds can spread the disease to quite a distance.

CHERRY. (1) The daughter of Boniface, the innkeeper in Farquhar's *Beaux' Stratagem.* (2) A nickname of Charity Pecksniff, in Dickens's *Martin Chuzzlewit.*

CHERRY-BIRD, or **CEDAR-BIRD.** See WAXWING.

CHERRY-LAUREL, or LAUREL-CHERRY. A popular name for certain evergreen species of the genus Prunus. They bear racemes of small, usually white, flowers and small nauseous fruits, the kernels of which somewhat resemble in flavor the kernels of almonds. The kernels and leaves of the cherry-laurel are poisonous although they are used to some extent for flavoring purposes. The leaves particularly are rich in the oil of bitter almonds which is obtained by aqueous maceration and distillation. The product is known as cherry-laurel water and was formerly used in medicine, but has recently declined in popularity. The common or English cherry-laurel (*Prunus Laurocerasus*), to which the foregoing remarks chiefly apply, is a native of Southeastern Europe and adjacent Asia. It is a shrub which sometimes attains a height of ten feet and which bears ovate-lanceolate, convex, smooth, shining, yellowish-green leaves and rather short terminal racemes. In Europe it is one of the most popular ornamental shrubs. It is rarely met with in the Northern United States except in greenhouses; but in California and in the States south of Virginia, it is becoming fairly common. The methods of propagation most in vogue are long mature wood cuttings and layers. Another European species is the Portugal cherry-laurel (*Prunus lusitanica*), which often reaches a height of twenty feet. It does not grow so well in the shade as the other species. The wild orange (*Prunus Caroliniana*), popularly termed in the South the mock orange, is the best-known American representative of the cherry-laurels. Throughout its range from South Carolina to Texas it often exceeds thirty feet in height. It is highly prized for ornamental planting because of its shining, dark-green leaves and short racemes of cream-colored flowers which appear in March.

CHERRY VALLEY. A village in Otsego County, N. Y., 68 miles west of Albany, on the Delaware and Hudson Railroad (Map: New York, F 3). Population, in 1890, 685; in 1900, 772. It was the scene of a famous massacre during the Revolutionary War, 600 Indians under Joseph Brant and 200 Tories and English under Walter Butler attacking it on November 11, 1778, killing 16 of the small garrison stationed here and 30 of the inhabitants, including women and children, burning nearly all the buildings, and carrying off 71 prisoners, whom they treated with great cruelty. Consult Halsey, *The Old New York Frontier* (New York, 1901).

CHERSIPHRON, kĕr′sĭ-frŏn (Lat., from Gk. Χερσίφρων), (? -c.546 B.C.). A famous Cretan architect of the Sixth Century B.C., born at Cnossus. He planned, and in part constructed, the older temple of Artemis at Ephesus, being assisted in the work by his son Matagenes. Chersiphron apparently died before the completion of the sculpture of the columns—that is, before B.C. 546.

CHERSO, kĕr′sō. A long, narrow island of Austria, in the Adriatic, 12 miles south-southwest of Fiume (Map: Austria, D 4). It has an area of about 105 square miles. Its surface is generally hilly and rugged, with forests in the north. The vine and olive are cultivated to some extent. Administratively it belongs to the District of Lussin, Istria. Its inhabitants are chiefly engaged in maritime industries. Its population was 8274 in 1900, including over 3000 Italians. The chief town, Cherso, has a population of about 5000.

CHERSON, kĕr-sōn′. See KHERSON.

CHERSONESUS, kĕr′sō-nē′sŭs (Lat., from Gk. *Χερσόνησος*, from *χέρσος*, *chersos*, dry land + *νῆσος*, *nēsos*, island, land-island, i.e. peninsula). A name applied by the ancient Greeks to several peninsulas and promontories. Three of the most frequently mentioned are: (1) The Thracian Chersonese, northwest of the Hellespont; (2) the Tauric Chersonese, in the Black Sea, the modern Crimea; and (3) the Cimbrian Chersonese, the modern Jutland.

CHERT, chĕrt (akin to Ir. *ceart*, pebble, Welsh *careg*, stone, Gael. *carr*, shelf of rock). An amorphous mineral substance, composed of a mixture of hydrated and anhydrous silica, which has the hardness of quartz and a splintery or conchoidal fracture. The color varies from white to black, but is commonly a neutral gray or brown. Chert is commonly associated with carbonate rocks, particularly limestone, and is believed to be due partly to mechanical deposition, partly to chemical deposition from water at the time of the deposition of the carbonate rocks, and perhaps in part to a concentration or segregation subsequent to the formation of such rocks. The name hornstone was formerly more frequently employed for the same substance. See QUARTZ; SILICEOUS ROCKS.

CHERTSEY, chĕs′ĭ *or* chĕrt′sĭ (AS. *Ceortes ēg*, Ceort's island). A market town of Surrey, England, on the Thames, 25 miles west-southwest of London (Map: England, F 5). It is irregularly built and is surrounded by villas. The chief trade is in malt and flour. Many vegetables are raised for the London market. Population, in 1891, 11,300; in 1901, 12,760. Chertsey arose from a Benedictine monastery founded in 666, and rebuilt in 964 by Edgar. Charles James Fox lived on Saint Anne's Hill, about a mile from the town, and the poet Cowley lived and died here.

CHERUB (Low Lat., from Heb. *K'rūbh*, cherub; Heb. plural *cherubim*, Engl. plural also *cherubs*). The Hebrew name for a winged creature with a human countenance, which in the religious symbolism of the Old Testament is represented in attendance upon Jehovah, and as forming part of the court of heavenly beings around his throne. Cherubim are mentioned in Genesis (iii. 24) as guards of paradise; a cherub with a flaming sword hindered the approach of Adam and Eve to the sacred tree. In the Holy of Holies in the tabernacle, and afterwards in the temple, two cherubim wrought in embossed metal were represented above the mercy-seat or covering the ark of the covenant, so that they appeared to rise out of it. Figures of cherubim were also wrought into the hangings of the Holy of Holies, and into the carved woodwork of the walls and doors of the temple. The cherubim that appear in the visions of Ezekiel and the Revelation of John are of a much more complex character. In Ezekiel (chapter 1) they have the body of a man, whose head, besides a human countenance, has also that of a lion, an ox, and an eagle; they are provided with four wings, two of which support the chariot of Jehovah and serve to fly, while the other two cover the body. They move straight forward, not only by means of wings, but with whirling wheels full of fire. In the Revelation four cherubim, covered with eyes and having six wings, surround the throne of Jehovah; the first has the face of a lion, the second of an ox, the third of a man, and the fourth of an eagle. This gave rise at a very early period to the symbolical figures of the four Evangelists, the human countenance being associated with Matthew, that of the lion with Mark, of the ox with Luke, and of the eagle with John. In the developed system of Jewish angelology, the cherubim (so, e.g. in the Book of Enoch) form one of the ten highest classes of angels. In accounting for the origin of the symbol, one must distinguish between forms of it which are now distinctively Hebraic and such as evidently contain foreign admixtures. The cherub belongs to the class of winged monsters and chimæras that we encounter among various nations. Such are the winged griffins on Phœnician monuments, which have been traced back to the Hittite art of Syria. The existence of such monsters is probably connected with primitive notions of evolution which imagine a period in which creatures of a mixed type filled the universe. To the same order of ideas, therefore, as the cherubim belong the seraphim or 'winged serpents' which form part of the imagery in Isaiah (chapter vi.). In Ezekiel, however, specifically Babylonian developments of the original conception of cherubim have been introduced, and his description represents a combination of early Hebrew with later Babylonian notions. The fiery flames (as also the fiery burning sword referred to in Gen. iii. 24) is a Babylonian notion, and likewise the very complicated conception of a cherub with four faces. On the other hand, the cherubim seated on the covering of the ark represent the more primitive view of monsters guarding the approach to a sacred spot and chosen by the deity as his bodyguard, though in the art itself, since the description of the tabernacle may belong to a later period, foreign elements may be discerned. It is rather strange that the cherubim, which are thus of a forbidding character, should have become the kind of angels that are ordinarily associated with the term. The transition to the more pleasing conception is found in Jewish angelology above referred to, in which the cherubim are represented as youthful angels, bearing the glory of God as it passes through the heavens. In the hierarchical gradations established by Christian theologians, cherubim rank next to the seraphim as the second of the nine orders of angels.

CHERUB, The. A nickname given to the meek and angelically patient father of Miss Bella Wilfer in Dickens's *Our Mutual Friend*.

CHÉRUBIN, shâ'ry'băɴ'. A valet in the *Mariage de Figaro*, by Beaumarchais (q.v.). He is portrayed as a precocious youth just growing into manhood, ignorant of the opposite sex, but intoxicated with his own continual thoughts of them.

CHÉRUBIN DE LA RONDA, de lä rōɴ'dä', Don. The name of the 'Bachelor of Salamanca' in Le Sage's novel of that name.

CHERUBINI, kā'rōō-bē'nê. Maria Luigi Carlo Zenobio Salvatore (1760-1842). An Italian composer. He was born in Florence, and began to study music at the age of six, under his father, a musician in the Pergola Theatre, and composition when nine years of age, under the brothers Felici and Bizarri and Castrucci. His earliest work was a Mass and Credo in D, and by 1776 his list included a Te Deum and an oratorio. Granted an allowance by the Grand Duke, he went to Bologna in 1778, spending there and in Milan four years under Sarti, from whom he acquired his remarkable knowledge of counterpoint and fugue. In 1780 his first opera, *Quinto Fabio*, was produced, and was followed quickly by other dramatic works. In 1784 he went to London, and held the post of composer to the King for one year. Here two operas, *La finta principessa* and *Giulio Sabino*, were brought out. In 1785 he visited Paris, and later Turin, and produced *Ifigenia in Aulide* (1787), returning in 1788 to make Paris his home. *Démophon* (1788) indicated that he was adopting a new style, and *Lodoïska* (1791) proved that he had abandoned the light Neapolitan style of his earlier works. Among later operas were: *Elisa* (1794); *Médée* (1797); *L'hôtellerie portugaise* (1798); *Les deux journées*, in German called *Der Wasserträger*, and considered his operatic masterpiece (1800); and *Anacréon* (1803).

In 1795 Cherubini was appointed one of the *inspecteurs des études* in the new Conservatory of Music. In 1805 he went to Vienna to write an opera for the Imperial Opera House. Here he made the acquaintance of Haydn and Beethoven, both of whom considered the opera *Faniska* (1806) a masterpiece. He returned to France, but finding little favor with Napoleon, went to the estate of the Prince de Chimay to recuperate. At the latter's request he wrote a church composition, the famous Mass in F (1809), and after that date wrote almost exclusively sacred music. In 1814 he was made a knight of the Legion of Honor by Louis XVIII. In 1815 Cherubini visited London, where he composed a symphony and overtures for the Philharmonic Society. In 1816 he was appointed, with Lesueur, musician and superintendent of the King's chapel, and 1821-41 he was director of the Paris Conservatory, which he advanced to the high standard it still preserves. Cherubini has been called "the link between classic idealism and modern romanticism." "His sacred compositions, notably the requiems in C and D (1817 and 1836), are distinguished by a severe grandeur, and his dramatic work by brilliant and original instrumental effects." His work on counterpoint (1835) is still a standard. For his life, consult: Berlioz, *Mémoires* (Paris, 1878); Bellasis, *Cherubini* (London, 1874) with catalogue of compositions, and the memoir by Pougin, in *Le Menestrel;* and Crowest, *Cherubini* (London and New York, 1890).

CHÉRUEL, shâ'rụ'ĕl', PIERRE ADOLPHE (1809-91). A French historian. He was born in Rouen, was educated at the École Normale of Paris, became an instructor there in 1849, and in 1866 was appointed inspector-general of public education and rector of the Academy of Strassburg. Subsequently he held the rectorate of the Poitiers Academy. He wrote a number of accurate, thorough, and very readable works, such as the *Dictionnaire historique des institutions, mœurs et coutumes de la France* (2 vols. 1855; 6th ed. 1884), and the *Histoire de France sous le ministère de Mazarin* (3 vols. 1882-83).

CHERUSCI, kē-rŭs'sī. A German tribe first mentioned by Cæsar. They dwelt in the region of the Weser, their country lying to the northeast of that of the Chatti. They are chiefly memorable in connection with their great leader, Arminius, or Hermann, who, having formed an alliance with other German tribes, attacked and annihilated the Roman legions under Varus, in the Teutoburg Forest, A.D. 9. After the death of Arminius, internal strifes broke out among the Cherusci, and Tacitus says that they were subjugated by the Chatti, a neighboring tribe. Notwithstanding this, they again appear as the chief tribe in the military league of the Saxons about the end of the Third Century. In the beginning of the Fourth Century they are included among the peoples who had leagued against Constantine, and toward the close of the same century are still mentioned distinctively by Claudian.

CHER'VIL (AS. *cerfille*, Ger. *Kerbel*, from Lat. *cærefolium*, from Gk. χαιρέφυλλον, *chairephyllon*, from χαίρειν, *chairein*, to rejoice + φύλλον, *phyllon*, leaf) (*Scandix cerefolium* or *Anthriscus cerefolium*). An umbelliferous plant which has long been cultivated as a pot-herb, used in soups and for a garnish, in the same manner as parsley. It is much more used in some parts of the Continent of Europe than in Great Britain or in the United States. It is a native of Europe naturalized in some parts of England and in a few localities in the United States. The leaves have a peculiar, somewhat sweetish, pleasantly aromatic smell and taste, by which the plant may be known from its congener *Scandix anthriscus*, a weed whose leaves have a disagreeable smell, and which is also distinguished by its hispid fruit. The umbelliferous plant called Venus's-comb or shepherd's-needle (*Scandix pecten* or *Scandix pecten veneris*), a native of Europe, often found in grainfields, and remarkable for the appearance and large size of its fruit, and another species, *Scandix australis*, which grows in the south of Europe, have a taste and smell resembling chervil, and are used in the same way on the Continent. Sweet chervil, or sweet cicely (*Myrrhis odorata*, the *Scandix odorata* of the older botanists), a native of the south of Europe and of some parts of Asia, common in the neighborhood of houses in Great Britain, although probably not a true native, is frequently cultivated in Germany under the name of Spanish chervil or anise chervil. In Scotland the plant is commonly called myrrh by the peasantry. Its smell is peculiarly attractive to bees, and the insides of empty hives are sometimes rubbed with its leaves, to induce swarms to enter. *Chærophyllum tuberosum*, sometimes called turnip-rooted chervil, is cultivated for the sake of its carrot-shaped roots, which are used in the same manner as carrots. The seed is said to lose its vitality quickly, and should be stratified or sown in the fall soon after ripening. The quality of the root is said to be improved by keeping.

CHERVILLE, shâr'vēl', GASPARD GEORGES, Marquis de (1821-98). A French author. He was born in Chartres, and for some time collaborated with the elder Dumas. Subsequently he became known as a writer on the chase, angling, and animal life. From the list of his independent works may be cited: *Les aventures d'un chien-de-chasse* (1862; 2d ed. 1882); *Histoire d'un trop bon chien* (1867; an illustrated ed. 1884); and *Les éléphants* (1895).

CHER'WELL. A stream which falls into the Isis, or Thames, near Oxford, England. It rises in the southwest of Northamptonshire, and forms the western boundary of Oxfordshire for a considerable distance (Map: England, E 5).

CHES'APEAKE, THE. A thirty-eight-gun vessel famous in the history of the American Navy. Early in 1807, after undergoing partial repairs in the Washington Navy Yard, she proceeded to Hampton Roads, where Commodore James Barron (q.v.) assumed command. On June 22, poorly equipped, insufficiently manned by an untrained crew, and wholly unfit for immediate action, she started across the Atlantic on a training cruise; but when well out to sea was overtaken and stopped by the British frigate *Leopard*, 50 guns, whose commander demanded the restitution of British deserters alleged to form a part of the *Chesapeake's* crew. On Barron's refusal to return the sailors demanded, or to permit search for them, the British attacked with vigor, soon killing three and wounding eighteen of the Americans and seriously crippling their vessel. From the *Chesapeake* only one gun was fired, and that with great difficulty and without effect. Barron finally struck his colors, and the British reclaimed four deserters, three of whom, though they had been formerly impressed into the British service, were native-born Americans. The affair caused intense excitement throughout the country, anti-British feeling ran high, and the people everywhere demanded 'reparation or war.' President Jefferson immediately (July 2) issued a proclamation, which proved futile, ordering British cruisers to depart from American ports and forbidding all aid and intercourse with them; and, through Monroe, indignantly demanded redress, but without avail, from the British Government. The incident was one of the chief occurrences that led up to the War of 1812, and is famous in American history as 'The *Chesapeake* Affair' or the '*Chesapeake* Outrage.' On June 1, 1813, the *Chesapeake*, then commanded by Captain Lawrence and carrying 50 guns, fought a battle in Massachusetts Bay with the British thirty-eight-gun vessel the *Shannon*, Captain Broke, then carrying 52 guns. The two vessels were almost evenly matched, except that the *Chesapeake* had an untrained crew and had only recently changed captains. After an engagement lasting fifteen minutes, the *Chesapeake*, rendered unmanageable by the terrible fire of the *Shannon*, was forced to surrender after Captain Lawrence had received a mortal wound. This gallant commander exhorted his men to the end with the words, "Don't give up the ship!" Out of a crew of 379, the *Chesapeake* lost 61 killed or mortally wounded, and 85 severely and slightly wounded: while out of a crew of 330, the *Shannon* lost 33 killed and 50 wounded. The *Chesapeake* was taken as a prize to Halifax, was afterwards used as a British war-vessel, and in 1820 was sold as old timber. Consult: Henry Adams, *History of the United States*, Vol. IV. (9 vols., New York, 1889-91); McMaster, *History of the People of the United States*, Vols. III. and IV. (New York, 1883—); Cooper, *History of the Navy of the United States* (2 vols., London, 1839); Roosevelt, *The Naval War of 1812* (New York, 1882); and Barnes, *Naval Actions of the War of 1812* (New York, 1896).

CHES'APEAKE BAY (N. Amer. Indian, great salt water). The largest inlet on the Atlantic coast of the United States (Map: United States, L 3: Maryland, M 5). It penetrates Virginia and Maryland, and is 200 miles long, with a maximum width of nearly 40 miles, but an average width of less than 20 miles. Its entrance, 12 miles wide, has on the north Cape Charles (q.v.), and on the south Cape Henry (q.v.). This bay has numerous arms, many of which are the estuaries of navigable rivers, such as the Susquehanna, Gunpowder, Patapsco, Patuxent, Potomac, Rappahannock, York, and James rivers on the western shore, and the Elk, Chester, Choptank, Nanticoke, and Pocomoke rivers on the eastern shore. Unlike the shallow sounds in North and South Carolina, this network of gulfs and estuaries, with an average depth of from 30 to 60 feet (usually the latter in the main channel), affords navigation for the largest vessels. In consequence, Baltimore and Norfolk are extensive shipping ports. Chesapeake Bay is noted for its extensive oyster-beds, and the vast numbers of water-fowl which frequent its waters. The shore lands of the bay produce a great amount of garden stuff, which is sent to Baltimore and the Northern markets. Chesapeake Bay is connected with Delaware Bay by canal.

CHESAPEAKE BAY DOG. See FIELD DOG.

CHESELDEN, chĕs'el-den, WILLIAM (1688-1752). An English surgeon and anatomist. He commenced his medical studies in 1703, established himself as a lecturer on anatomy in 1711, and in the following year was elected a fellow of the Royal Society. He was afterwards appointed surgeon to Saint Thomas's, Saint George's, and Westminster hospitals, where he acquired a great reputation as an operator. His principal works are: *Anatomy of the Human Body* (1713), long a text-book on the subject in England; a *Treatise on the High Operation for the Stone* (1723); and *Osteology, or Anatomy of the Bones* (1733).

CHESHIRE, chĕsh'ẽr (for *Chestershire*, from *Chester*, the capital of the county + *shire*). A maritime county in the west of England, bounded north by the river Mersey and partly by the Irish Sea (Map: England, D 3). Its area is 1009 square miles. The surface forms an extensive, nearly level plain between the Derbyshire and Welsh mountains, chiefly occupied by grazing and dairy tracts, which are among the most important in England. Dairy farming and cheese-making are the principal agricultural industries. Cheshire is also an important manufacturing county. The chief mineral products are rock salt and coal. The chief towns are Chester (the county town), Macclesfield, Stockport, Congleton, Knutsford, and Birkenhead. Population, in 1891, 730,058; in 1901, 814,550.

CHESHIRE, JOSEPH BLOUNT (1850—). An American Protestant Episcopal clergyman, Bishop of North Carolina. He was born at Tarboro, N. C., graduated at Trinity College (Hartford, Conn.) in 1869, and practiced law from 1872 to 1878. He was ordained priest in 1880, was consecrated bishop coadjutor in 1893, and bishop in the same year. His publications include *The Early Conventions of the Episcopal Church in North Carolina* (1882), and various pamphlets and addresses. He has edited *Sketches of Church History in North Carolina* (1892).

CHESHIRE CHEESE. See CHEESE; CHEESE-MAKING.

CHES'HUNT. A town of Hertfordshire, England, on the Lea, about 7 miles south of Hertford and 14 miles north of London (Map: England, F 5). It is famous for its rose-gardens, and has a large theological college. Population, in 1901, 12,300. Cheshunt was probably a Roman station. Consult *Cheshunt College* (London, 1868).

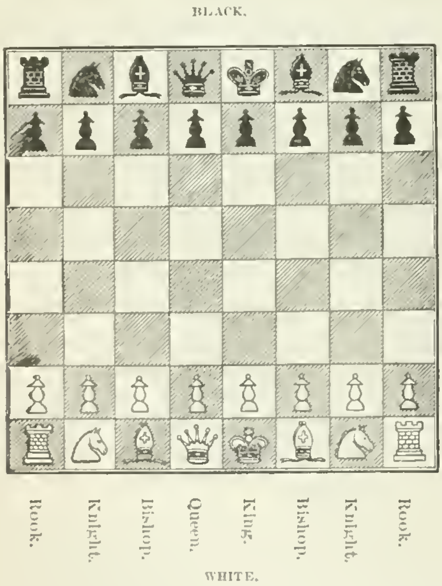
CHESNEY, chĕs'nĭ, CHARLES CORNWALLIS (1826-76). A British military engineer and critic. He was a brevet colonel in the British Royal Engineers, and for many years was professor of military history at the Staff College at Sandhurst. He first attracted general attention by *A Military View of Recent Campaigns in Virginia and Maryland* (1863), and in 1868 published his *Waterloo Lectures*, perhaps his ablest work. He also published *The Military Resources of Prussia and France* (1870), and *Essays in Modern Military Biography* (1874). The latter contains valuable critical estimates of the military careers of Generals U. S. Grant and R. E. Lee, and of 'Chinese' Gordon.

CHESNEY, FRANCIS RAWDON (1789-1872). A British soldier and explorer. In 1829 he inspected the route of the Suez Canal and proved the undertaking to be feasible, so that De Lesseps forty years afterwards styled him the 'Father of the Suez Canal.' He is especially known, however, as the explorer of the Euphrates, and the founder of the overland route to India by way of that river. He wrote: *Expedition for the Survey of the Euphrates and Tigris* (1850), and *Narrative of the Euphrates Expedition* (1868). Consult his *Life*, by his wife and daughter, edited by Stanley Lane-Poole (London, 1885).

CHESS (OF. *esches*, Fr. pl. *échecs*, from It. *scacchi*, Med. Lat. *scacci*, from Pers. *shāh*, king). The origin of this, the most intellectual of all games of skill, has been much disputed; but it is safe to say that under the Sanskrit name of *chaturanga*, consisting of four members, a game essentially the same as modern chess was played in Hindustan in very remote ages. Marked traces of its early Asiatic origin may still be discerned in its nomenclature and other characteristics. From Hindustan, chess spread into Persia, and thence into Arabia. The Arabs, it would appear, introduced it into Spain in the Eighth Century; though it may have been imported still earlier into Constantinople and probably some other cities of eastern Europe. An interesting reference to it occurs in the French poem of "Huon de Bordeaux" (c.1450), which supplied Shakespeare with some of the *dramatis personæ* of his *Midsummer Night's Dream.* This connection is especially noteworthy because of the probability that it also suggested to him the introduction of Ferdinand and Miranda playing at chess in the *Tempest;* although it is likely that he was acquainted with the fact that during his own lifetime Naples, the country of Ferdinand, was the centre of European chess-playing, and skill in the game temporarily reached a height which it never attained again until the middle of the Eighteenth Century, when Philidor (F. A. Danican) became famous all over Europe.

Benjamin Franklin was the first American to bring the game into prominence, both as a player and a writer; but its practice was confined to a few until the early part of the Nineteenth Century. By 1857 there were sufficient chess clubs to justify a national congress, at which Paul Morphy of New Orleans won the championship. He was such a phenomenal player that next year he was sent to Europe, and there he carried off all the honors. From that time chess has had a settled place among our pastimes, and Americans, in all the phases of the game, in international contests, have held a high place.

The original Hindu game was played on a board of sixty-four squares, as now, but by *four persons,* two being allied against two, as in whist. Hence the name *chaturanga,* from *chatur,* 'four,' and *anga,* 'a member' or 'component part.' The name *shatranj,* used by the Persians and Arabs, is a corruption of the Sanskrit. The English, French, and other European names are derived from the Persian term *shah,* 'king.' *Check,* the warning when the king is in danger, is but another form of *shah;* in fact, 'king' is sometimes used for 'check,' and in German *schach* is both the name of the game and the term of warning. The term *rook* is from the Sanskrit *roka,* Persian *rukh,* meaning a ship or chariot; *pawn* is said to be from *peon,* an attendant or foot soldier.



The chess-board is marked out into sixty-four square divisions, which are colored alternately black and white, in order the more clearly to determine and denote the respective movements of the several pieces. In placing the thirty-two pieces with which the game is played upon the board, each player must always have a *white* corner square at his right hand. There are two sets of pieces, of opposite colors, of sixteen men each, and of various powers according to their rank. These sets of men are arrayed opposite to each other and attack, defend, and capture like hostile armies. The accompanying diagram will best explain the name, form, and place of each man at the commencement of the game.

The superior officers occupying the first row on each side are called *pieces;* the inferior men, all alike, standing on the row immediately in front of the pieces, are called *pawns.* Their moves and powers, along with the peculiar terms used in chess, may be briefly described as follows:

A *pawn,* at his *first* move, may advance either one or two squares, straightforward; but after having once moved, he can only advance a single square at a time. In capturing an adverse piece, however, a pawn moves one square diagonally, either right or left; but the pawn never moves backward. On arriving at an eighth square, or the extreme line of the board, a pawn may be exchanged for any piece his owner chooses to call for, except a king, so that a player may have several queens on the board at once. If, on moving two squares, a pawn pass by an adverse pawn which has arrived at the fifth line, the advanced adverse pawn may take the other *in passing* in exactly the same manner as if the latter had moved but one square.

A bishop moves any number of squares diagonally, but diagonally only; therefore a bishop can never change the color of his square.

A knight moves two squares, so as always to change color—that is, he moves one square forward or backward and one diagonally. On account of this crooked movement, he can leap over or between any surrounding pieces; and therefore a knight's check—unless he can be taken—always compels the king to move.

The rook, or castle, moves any number of squares forward, backward, or sidewise, but not diagonally.

The queen is by far the most powerful of the pieces, and moves over any number of squares, either in straight lines or diagonals, forward, backward, or sidewise; so that her action is a union of that of the rook and bishop. At starting the queen always stands on a square of her own color.

The king is the most important piece on the board, as the game depends upon his safety. He moves only one square at once, in any direction, except when he *castles*—a term to be explained presently. The king cannot be taken; but when any other piece attacks him, he is said to be in *check,* and must either move out of check or interpose some one of his subjects, unless the checking piece can be captured. When there is no means of rescuing the king from check, he is said to be checkmated, and the game is over. Of course, the two kings can never meet, as they would be in check to each other. *Double check* is when a piece, by being moved, not only gives check itself, but also discovers a previously masked attack from another.

Castling is a privilege allowed to the king once in a game. The move is performed either with the king's rook or queen's rook; in the former case the king is moved to the king's knight's square and the king's rook is placed on the king's bishop's square; in the latter case the king is played to the queen's bishop's square, and the queen's rook played to the queen's square. But the king cannot castle after having once moved, nor at a moment when he is actually in check, nor with a rook that has moved, nor when he passes over a square attacked or checked by an adverse piece, nor when any piece stands between him and the rook with which he would castle, nor when in the act of castling either the king or rook would have to capture an adverse piece.

A *drawn* game results from neither player being able to checkmate the other; thus, a king left alone on each side must of course produce a draw, as does also a king with a bishop, or a knight, against a king.

Stalemate, or the not being able to move either the king or any other piece, also constitutes a drawn game.

Odds is a term applied to the advantage which a stronger player should give to a weaker; thus, the removal of a rook or knight from the better player's forces may be fair odds; or, if the players are more nearly matched, the one may give a pawn. When the odds of a pawn are given, it is always understood to be the king's bishop's pawn.

Gambit is a technical word implying the sacrifice of a pawn early in the game, for the purpose of taking up an attacking position with the pieces.

Supposing the worth of a pawn to be represented by unity, the following is a tolerable average estimate of the comparative value of the pieces: Pawn, 1; bishop, 3; knight, 3; king, 4; rook, 5; queen, 9.

The rows of squares running straight up and down the board are called *files*, those running from side to side are called *lines*, and those running obliquely across are termed *diagonals*.

The playing over the following short game will serve the learner as a little initiatory practice:

WHITE.	BLACK.
1. King's pawn two.	1. King's pawn two.
2. King's bishop to queen's bishop's 4th.	2. King's bishop to queen's bishop's 4th.
3. Queen to king's rook's 5th.	3. King's knight to king's bishop's 3d.
4. Queen takes [*] king's bishop's pawn, giving black checkmate.	

The foregoing brief mode of giving a checkmate is called the *scholar's mate*, and is often practiced upon young and unwary players. Any contractions used, such as 'K' for king, 'B' for bishop, etc., will readily be understood by the use of the diagrams.

In the conduct of the game, and in the practice of chess, the following rules, precepts, and hints will be found very generally useful: Play forth your minor pieces early, and castle your king in good time. You may sometimes delay castling with advantage, but not often. Do not expect to be able to establish an enduring attack with half your forces at home. Seek to let your style of play be attacking, and remember the gaining or losing of time in your measures is the element of winning or losing the game. Never touch a piece without moving it, nor suffer yourself or your opponent to infringe any other of the laws of the game.

You will find, when first player, that the opening, springing from your playing first king's pawn two, and then your king's knight to the bishop's third, is one of the best that you can adopt; but do not adhere to any one opening only. If you wish to adopt a purely defensive opening, you may play first king's pawn one, and follow up with Q P 2 and Q B P 2. Next to playing with good players, nothing will conduce to improvement more than looking on at two expert players while they play. Wanting these advantages, it is best to play over openings and actual games from books or journals. To prevent blunders and oversights, always endeavor to perceive the motive of your adversary's move before you play; and look often round the board to see that you are not losing sight of any better move than the one you intended, or that you are not suffering yourself to be tempted by a bait.

THE LAWS OF CHESS. The most elaborate and complete code of rules is to be found in Staunton, *Chess Praxis* (London, 1860). In that code every law of the game is fully explained, filling sixty-six pages of the book.

For the antiquities of the subject, consult Forbes, *History of Chess* (London, 1860). Modern practical works are: Morphy, *Games at Chess*, edited by Lowenthal (New York, 1860); Staunton, *Chess: Theory and Practice* (London, 1876); Gossip, *Chess Player's Manual* (London, 1875); Walker, *Chess and Chess Players* (London, 1850).

CHESS, or **CHEAT.** A common name of the *Bromus secalinus*. See BROME GRASS.

CHEST (palatalization of AS. *cist*, *cest*, from Lat. *cista*, Gk. *κιστη*, *kistē*, chest, box), or THORAX. In anatomy, the part of the body which lies beneath the neck and above the abdomen (q.v.), constituting the uppermost of the two divisions of the trunk, or that which contains the heart and lungs and is bounded externally by the ribs. The chest is somewhat conical in form, the broad or lower end of the cone being shut in by the diaphragm, a large muscular partition which projects upward from the lower ribs, being convex toward the chest and concave toward the abdomen. In respiration (q.v.), the diaphragm descends by its own muscular contraction, while at the same time the ribs are drawn upward and outward by the accessory muscles of inspiration. The cavity of the chest is thus enlarged, the lungs are expanded, and air is drawn into them through the trachea, or windpipe, and the bronchial tubes. The combination of bone, cartilage, muscle, and tendon entering into the composition of the chest are such as to permit of expansile movement to the extent required, and yet to guard against over-expansion, which would be fatal to the delicate structures within. The bones of the chest are at the same time a powerful protection against external injury.

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[*] Taking is always performed by lifting the captured man from the board and placing the captor on his square. The pawn is the only man whose mode of taking differs from his ordinary move.

The structures forming the walls of the chest are: (1) The backbone or spinal column, divided into twenty-four true vertebræ, twelve of which, called the dorsal vertebræ, form the thoracic portion. (2) Twelve ribs on either side, attached behind the dorsal vertebræ, and ending in front in the costal cartilages. (3) The sternum, or breast-bone, which occupies the middle line in front, and to which the costal cartilages are attached on either side. (4) The diaphragm (q.v.). See also SKELETON.

The contents of the chest are the heart, the great arteries and veins, the lungs, the trachea or windpipe, the bronchi or branches of the trachea, leading to the lungs, the œsophagus or gullet, certain important nerve-trunks, and the thoracic duct (q.v.) or general terminus of the lymphatic system of vessels, by which the chyle and lymph are discharged into the blood. The very great importance of these parts to life, and their great liability to deranged action, renders the chest the seat of a large proportion of the diseases which afflict humanity, and especially of those which end in death. Indeed, of the three organs which the great physiologist Bichat called the 'tripod of life'—viz. the brain, heart, and lungs—the chest contains two; hence its condition in almost all diseases, and especially in fatal diseases, is an object of the utmost solicitude to the physician.

The diseases of the chest depend in some cases on alterations in its form, as by rickets (q.v.) and other conditions affecting the bones in early childhood or in youth, or by too tight lacing in girls. The lungs and air-tubes are subject to a great variety of diseases, among which the principal are consumption, or pulmonary tuberculosis (q.v.), pneumonia (q.v.), pleurisy (q.v.), and bronchitis q.v.). The heart is subject to pericarditis, endocarditis, enlargement (hypertrophy), dilatation, and degeneration of its muscular texture. The aorta, or great artery, is often affected with degeneration of its walls, and occasionally with aneurism. The great veins are liable to over-distension, and to obstruction by tumors or by coagulation of the contained blood. The thoracic duct is also sometimes obstructed by external pressure, and the œsophagus has a number of diseases usually described in connection with the alimentary canal. Most of the diseases here referred to are described either in special articles, or under HEART, DISEASES OF. See also the articles AUSCULTATION, and PERCUSSION.

CHEST, NAVAL. The name of Chest has been given to certain funds maintained for the benefit of seamen belonging to the English Navy. A fund, called the *Chest at Chatham*, was suggested so long ago as the days of Drake and Hawkins, for the relief of superannuated and wounded seamen. In 1590 all seafaring men in Queen Elizabeth's service consented to a stoppage out of their pay of two shillings to six shillings per month to support this fund. The money was not in those days, as it would be now, put out to interest; it was kept in a chest, and hence the name given to the fund itself. During the Eighteenth Century the system became organized in a better manner; but still the fund retained the name of chest; insomuch that when the office was removed from Chatham to Greenwich, in 1803, it became the *Chest at Greenwich*. The chest is managed ex officio, and the accounts are annually laid before Parliament. Handsome gifts are occasionally made to the fund by individuals. Disabled sailors receive a present sum of money, if not deprived of the power of earning a living; but if their injuries are more permanent they receive a pension from the Chest for one year, or for several years, or for life, paid half-yearly.

CHES'TER (AS. *ceaster*, from Lat. *castra*, camp). An ancient episcopal city, municipal and Parliamentary borough, and river port, the capital of Cheshire, England, on the right bank of the Dee, 22 miles from its estuary, and 16 miles southeast of Liverpool (Map: England, D 3). It stands on a rocky sandstone height, the greater part being inclosed by ancient walls seven or eight feet thick, nearly two miles in circuit, pierced by four gates, and now forming a promenade from which excellent views of the city and vicinity are obtained. The two main streets cross each other at right angles, and were cut out of the rock by the Romans four to ten feet below the level of the houses. The houses in these streets are curiously arranged; the front parts of their second stories, as far back as 16 feet, form a continuous paved promenade or covered gallery, open in front, and reached by flights of steps from the street below, with private houses above, inferior shops and warehouses below, and the chief shops of the town within. These arcades, called the 'Rows,' together with the ancient walls and the half-timbered construction of many of the houses, with quaintly carved ornamental gables of the Sixteenth Century, render Chester perhaps the most picturesque city in England. The cathedral is an irregular massive structure of crumbling sandstone, with a tower of 127 feet. It was formerly the Church of the Abbey of Saint Werburgh, which for six hundred and fifty years was one of the richest in England. The cathedral grammar school was founded by Henry VIII. Saint John's Church, long in ruins, but partially restored since 1868, is supposed to have been of early Saxon origin. Among other noted buildings are the castle built by William the Conqueror, now used as barracks, the town hall, linen hall, and music hall. There are also many quaint private houses, such as *God's Providence House*, so called from the inscription on it; Bishop Lloyd's House, and Stanley House. The Dee is crossed by three bridges—an old stone one, a suspension bridge, and Grosvenor Bridge, consisting of one superb stone arch of 200 feet span. Chester sends one member to Parliament. Although Chester can boast of great antiquity, it has not fallen behind in carrying out modern improvements, and this has been done with due regard to the quaint architectural features of the city. Electric lighting has been installed; a modern sewerage system, including precipitation works, has been introduced; public baths, markets, a free library, a museum, and a hospital are maintained by the municipality. There are two public parks, and on the Roodee, outside the walls, there is a large race-track, from which the city derives a considerable profit. Chester has manufactures of lead, iron-foundries, chemical works, and a ship-building yard. It manufactures boots and shoes for export. Its principal trade, however, is in cheese, for which it is a famous market. It has an increasing shipping trade, importing metal ores, timber, etc., and exporting iron and its manufactures. Chester is the terminus of several railway lines, and the union railway station is one of the finest in Great Britain. About three and one-half miles from the city is Eaton Hall, the magnificent seat of the Duke of Westminster. Population, in 1891, 37,105; in 1901, 36,281.

Chester was the Deva of the Romans, the British Caer Lleonvawr, and the Saxon Legancester or Laegeceaster. It was devastated by Ethelfrid, King of Northumbria, in 607, after the massacre of 1200 monks of Bangor Yscoed, who had assembled to pray for the success of their compatriots. In 828 it was taken by the Saxons, and in 894 by the Danes. Ethelred retook it in 904, and rebuilt the walls. From the Norman Conquest to the time of Henry III. the earls of Chester had their own courts and parliaments at Chester, with eight subfeudatories and the superiors of the great religious houses, Chester being then a county palatine. Henry III. made his eldest son Earl of Chester, a title held since by the Prince of Wales. In 1128 the town received its first charter. After a long siege (1643-46) the Parliamentary forces took the city.

Bibliography. Howson, "Chester Cathedral," in *Cathedrals of England* (Philadelphia, 1895); Freeman, "Early History of Chester," in *Archæological Journal*, Vol. XLIII. (London, 1886); Lach-Szyrma, "The Rows of Chester;" Picton, "The Walls of Chester;" Smith, "The Walls of Chester," in *Archæological Journal*, Vol. XLIV. (London, 1888).

CHESTER. A town and port of entry on Mahone Bay, Lunenburg County, Nova Scotia, Canada, 45 miles southwest of Halifax (Map: Nova Scotia, E 5). The town was founded by New Englanders in 1760, and has manufacturing and fishing industries. Population, 2000. The village of Chester Basin, five miles distant, picturesquely situated on a hill overlooking the bay, is a popular summer resort.

CHESTER. A city and county-seat of Randolph County, Ill., on the Mississippi River, 75 miles below Saint Louis, and on the Illinois Southern and the Wabash, Chester and Western railroads (Map: Illinois, C 6). It has a public library. The Southern Illinois Penitentiary and the Illinois Asylum for the Criminal Insane are situated here. The city carries on a considerable trade, and has manufactures of flour, knit goods, foundry products, wagons, etc. Population, in 1890, 2708; in 1900, 2832.

CHESTER. A city in Delaware County, Pa., 14 miles southwest of Philadelphia, on the Delaware River, and on the Baltimore and Ohio, the Pennsylvania, the Philadelphia and Reading railroads (Map: Pennsylvania, F 4). It has a free library, two hospitals, and two parks, and is the seat of the Pennsylvania Military College and the Crozer Theological Seminary (Baptist). Of historic interest are the city hall, built in 1724, and the house of William Penn. Chester has large manufactories of cotton and woolen goods, dyestuffs, iron and steel, boilers and engines, lumber in various products, cigars, plaster, boards, ice, and many other articles; and is noted for its ship-building. The government of the city is carried on by a mayor, elected for three years, and a bicameral city council. The executive, with the concurrence of the council, appoints the health board, park commissioners, police, and commissioner of highways; the city solicitor, engineer, and board of revision of taxes are elected by the council; other offices are filled by popular election. Population, in 1880, 14,997; in 1890, 20,226; in 1900, 33,988.

Chester, the oldest town in Pennsylvania, settled by Swedes in 1644, was called Upland until 1682, when Penn arrived and gave it its present name. It was laid out in 1700, was incorporated as a borough in 1701, and was chartered as a city in 1866. The first Pennsylvania Assembly convened here in 1682. During the Revolution it was alternately occupied by the British and the Americans, and after the battle of Brandywine, in 1777, Washington reassembled his troops here. Consult: Ashmead, *Historical Sketch of Chester* (Chester, 1883).

CHESTER. A city and county-seat of Chester County, S. C., 62 miles north by west of Columbia, on the Southern, the Seaboard Air Line, and other railroads (Map: South Carolina, C 2). It is in a fertile cotton-growing and general agricultural country, and has cotton-mills, cotton-gins, a cottonseed-oil mill, flour and lumber mills, iron and wood-working establishments, etc. Population, in 1890, 2703; in 1900, 4075.

CHESTER, Colby Mitchell (1844—). An American naval officer. He was born in Connecticut, graduated at the United States Military Academy in 1863, and in 1864 participated in the operations against Mobile. In 1881 he was appointed commander, and from 1881 to 1885 was hydrographic inspector of the coast survey. From 1888 to 1889 he was a member of the commission for establishing a navy-yard on the Pacific Coast, from 1890 to 1894 was commandant at Annapolis, and from 1897 to 1898 was commander of the South Atlantic Squadron. He was appointed captain in 1896.

CHESTER, Joseph Lemuel (1821-82). An American antiquary. He was born in Norwich, Conn., and until 1852 was a merchant's clerk in Philadelphia. He was afterwards clerk in the House of Representatives and aide-de-camp to the Governor of Pennsylvania. After 1858 he resided in London, where he spent ten years in the compilation of an annotated abstract of the registers of Westminster Abbey (1876). This work was published by the Harleian Society, of which, in 1869, he had been a founder. At the time of his death he was regarded as perhaps the most learned genealogist in England or America. He also edited *Educational Laws of Virginia* (1854); *The Reiester Booke of Saynte De'nis Backchurch* (1878); and other similar compilations.

CHES'TERFIELD. A municipal borough and market town in Derbyshire, England, at the confluence of the Hipper and Rother, about 12 miles south of Sheffield (Map: England, E 3). There are manufactures of leather, silk, lace, earthenware, and machinery; and the minerals in the neighborhood, including coal, iron, potters' and brick clay, slate, and lead, are being greatly developed. Trade is facilitated by a canal connecting Chesterfield with the Trent, and by the main line of the Midland Railway. Owing to the rapid growth of its manufactures and the increase of its population, it has become a flourishing municipality. The gas and water supplies are managed by a special board; parks, public baths, a cemetery, markets, and slaughterhouses are maintained by the municipality. It also operates its street railways. The town has an excellent system of sewerage, and in connection therewith maintains a sewage farm. Its educational institutions include an ancient grammar school and technical school, and a public library maintained by the town. The town is of great antiquity. Its first charter was received in the reign of King John. The parish church of All Saints, dating from the Fourteenth Century, is remarkable for its curious twisted spire. George Stephenson is buried in Trinity Church. Population, in 1891, 22,000; in 1901, 27,200. Consult Yeatman, *The Records of Chesterfield* (Chesterfield, 1884).

CHESTERFIELD, PHILIP DORMER STANHOPE, Earl of (1694-1773). An English statesman and author, eldest son of the third Earl of Chesterfield. He was born in London, September 22, 1694. He studied for about a year at Trinity Hall, Cambridge, and then left to travel in Flanders (1714). The next year he was appointed a gentleman of the bedchamber to the Prince of Wales, and entered the House of Commons as a Whig. On the death of his father (1726), he succeeded to the earldom and took his seat in the House of Lords. Two years later he was appointed Ambassador to The Hague; in 1730 he was made a Knight of the Garter and Lord Steward of the Household. Dismissed from office (1733), he became a bitter opponent of Walpole. Particularly brilliant was his speech against the Licensing Act (1737). In 1744 he joined the Pelham Ministry, and the next year was appointed Lord Lieutenant of Ireland, a post for which he was admirably qualified. In 1746 he became Secretary of State, and was offered a dukedom. In 1748 he resigned office, and passed the rest of his life in leisure. He died March 24, 1773. Distinguished for wit and graceful manners, he was for a time on terms of intimacy with Pope, Swift, Bolingbroke, and other eminent contemporaries. At an inopportune time he thrust himself forward as a patron of Dr. Johnson, and was repudiated in a celebrated letter (February 7, 1755). Chesterfield's literary fame rests upon his *Letters* (published 1774) to his natural son, Philip Dormer, written for the improvement of his manners. Long very popular, these letters contain counsel still valuable. Their immorality was justly censured by Dr. Johnson, and with equal justice Sainte-Beuve praised their practical good sense. Consult: *Letters of Chesterfield*, edited by Lord Mahon (London, 1845-53), and by J. Bradshaw (London, 1892); also Browning, *Wit and Wisdom of Lord Chesterfield* (London, 1875); Hill, *Worldly Wisdom of Lord Chesterfield* (New York, 1891); and Collins, *Essays and Studies* (London, 1895).

CHESTERFIELD INLET. An inlet of Hudson Bay, which extends westward for a distance of over 200 miles from the northwest corner of the bay (Map: Canada, M 4). It has a variable width, which does not exceed 25 miles, and is in water connection, near its head, with the string of large lakes lying to the southwest. It contains a number of islands, and at its western extremity it widens into Baker Lake.

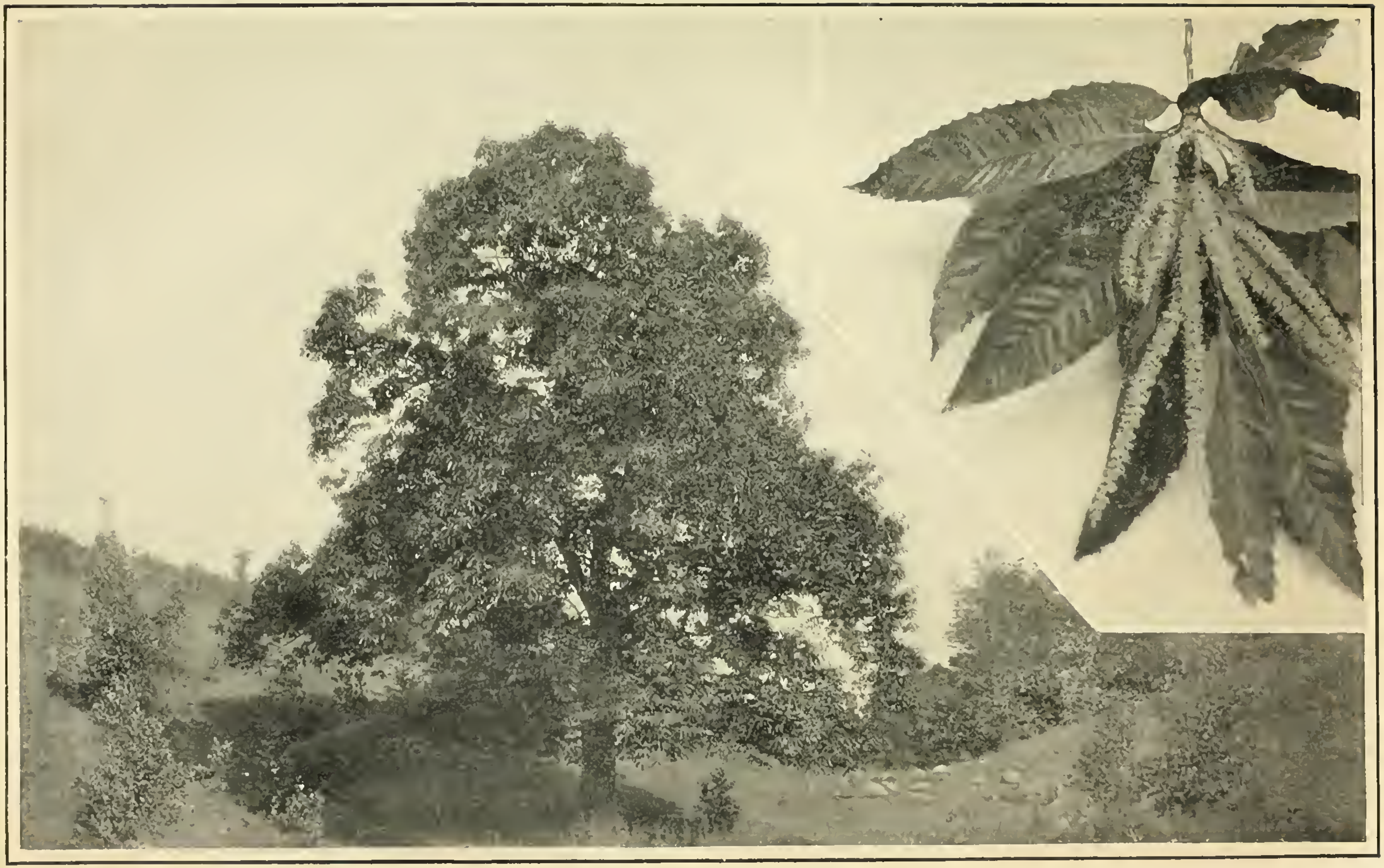
CHESTER PLAYS, THE. A group of mystery plays on scriptural subjects, twenty-four in all, played by the guilds of Chester during three days at Whitsuntide. A Sixteenth-Century proclamation concerning them ascribes them, in obscure phrase, to either Sir Henry Francis, a monk, or to Sir John Arnway, mayor of Chester in 1327-28. The earliest manuscript of them is in the possession of the Duke of Devonshire, and is dated 1581. The only complete edition of them was made by Mr. Thomas Wright, for the Shakespeare Society, London (2 vols., London, 1843-47).

CHES'TERTOWN. A town and county-seat of Kent County, Md., 30 miles east of Baltimore, on the Chester River, and on the Pennsylvania Railroad (Map: Maryland, N 4). It has planing-mills, strawboard-mills, and phosphate and basket factories. Washington College, organized in 1783, is situated here. The town government is administered by three commissioners, who hold office for three years. Population, in 1890, 2632; in 1900, 3008.

CHESTNUT, chĕs'nŭt (formerly *chesten-nut*, a contamination of AS. *cisten*, OHG. *chestinna*, *kestinna*, Ger. *Kastanie*, chestnut, and OF. *chastaine*, It. *castagna*, Lat. *castanea*, chestnut, from Gk. *καστανέα*, *kastanea*, Arm. *kask*, chestnut; connected with Gk. Κάστανα, *Kastana*, or Καστανaία, *Kastanoia*, a city of Pontus noted for chestnuts). *Castanea.* A genus of plants of the natural order Cupuliferæ, closely allied to the beech (*Fagus*), and distinguished from it by long male catkins, longitudinally set with groups of flowers, a five to eight celled ovary (bur), and compressed, rounded nuts. Three species are of horticultural and commercial importance for their nuts and wood—the European or Spanish chestnut (*Castanea sativa*), the Japanese (*Castanea Japonica* or *Castanea crenata*), and the American (*Castanea Americana*). The European chestnut grows wild in extensive forests in the south of Europe, west of Asia, and north of Africa, and is a large, stately tree. The nuts are usually two in each bur, very large, and of a dark mahogany color. The American chestnut is taller and more spreading. In forests it reaches a height of 100 feet, with a trunk 3 to 4 feet in diameter. It is native from Maine to Michigan and southward to Louisiana, and is generally found on high, sandy land, gravel ridges, or mountain slopes comparatively free from limestone. Twenty or more improved varieties are in cultivation. The Japanese chestnut is a smaller tree than either the European or American, and has a compact, symmetrical habit. Its large nuts, early and heavy bearing propensities, comparative freedom from blights, and complete union on either its own American-grown or on native American seedlings has brought it into extended use in the United States within recent years as an orchard tree and in grafting over native chestnut forests. Chestnuts are usually propagated from seed, and the seedlings are later grafted or budded with improved varieties. A common way in the United States is to graft the sprouts arising from the stumps of cut-over chestnut lands with European or Japanese varieties. Chestnut timber is coarse-grained, light, and durable, and it finds extensive use in furniture-making, and for posts and fence-timbers.

In addition to the three species noted above, there are a number of dwarf forms known as chinquapins. The common or tree chinquapin

CHESTNUT



CHESTNUT TREE AND FLOWER SPRAY (Castanea Americana).

(*Castanea pumila*) and the bush chinquapin (*Castanea alnifolia*) are natives of the States south and west of Pennsylvania as far as Texas. The former is a shrub four to five feet high, though occasionally reaching a height of 30 or 40 feet; the latter rarely exceeds three feet. The nuts are smaller than chestnuts, but ripen earlier, are edible, and to some extent marketed. A number of other species are native to the East. *Castanea argentea* and *Castanea tungurrut* of Java are large trees with edible nuts. *Castanopsis chrysophylla* is a California evergreen, the small fruit or nuts of which are eaten. The horse-chestnut (q.v.) is entirely different from the true chestnut.

Food Value.—Chestnuts when fresh contain 84 per cent. of edible portion and 16 per cent. of refuse (shell). The edible portion has the following percentage composition: Water, 45.0; protein, 6.2; fat, 5.4; total carbohydrates, 42.1; and ash, 1.3. The fuel value is 1125 calories per pound. Unlike most nuts, the chestnut is rich in carbohydrates (largely starch), rather than fat or protein. In Europe steamed chestnuts are eaten either with salt or milk. They are also boiled and roasted, or are used combined with other food materials, and in the manufacture of confectionery. In the form of a cake, called in Italy '*necci*,' they are a common food. In the United States they are eaten raw or roasted, and are also used for making dessert, for stuffing poultry, and in other ways. The candied chestnuts, or '*marrons glacés*,' are also well known. According to recent investigation, cooked chestnuts are quite thoroughly digested. Chestnuts are dried, and are sometimes ground to a flour, used for making a bread or cake.

CHESUN'COOK LAKES. A name given to a group of lakes in Piscataquis County, Maine, the chief being Chesuncook Lake, 18 miles long and from 1 to 2 miles wide, and Ripogenus Lake, 2 miles long and 1 mile wide, which are but expansions of the Penobscot River (Map: Maine, E 4). Lake Chesuncook has the following feeding lakes or ponds: Longeley Pond, Umbazooksus Lake, Cuxabexis, Duck and Moose ponds, Mud Pond, Ragged Lake, and Caribou Lake, 7 miles long and 1½ miles wide. Lake Ripogenus has as a feeder Harrington Lake, 3 miles long and 1 mile wide. Lobster Pond, 5 miles long and 1½ miles wide, between Ragged Lake and North Bay of Moosehead Lake, may also be included in the Chesuncook system. Lying to the northwest of this section and directly connected with it by the Cauquomgomoc River, 12 miles long, are Lake Cauquomgomoc, about 7 miles long and nearly 2 miles wide, and its feeding lakes—Lone Lake, Poland Pond, Round Pond, and Shallow Lake.

CHETIMACHES, shĕt'ĭ-măsh', **LAKE.** See GRAND LAKE.

CHET'TLE, HENRY (? -c.1607). An English dramatist. Of the thirteen or more plays he wrote single-handed, only one has survived—the lurid *Tragedy of Hoffman, or a Revenge for a Father* (performed 1602, printed 1631, edited by H. B. Leonard, 1851). Of thirty-six plays on which he collaborated, only four were printed. Very attractive is *The Pleasant Comedie of Patient Grissil* (printed 1603; edited by J. P. Collier, 1841). Chettle's name is forever linked with Shakespeare's. He edited Greene's *Groatsworth of Wit* (1592), in which Shakespeare was attacked; apologized in a memorable passage in a pamphlet entitled *Kind Heart's Dream* (1592 or 1593; reprinted by C. H. Ingleby in *Shakespeare Allusion Books*, 1874); and apparently alluded to Shakespeare in "Silver-tongued Melicert," in *England's Mourning Garment* (1603; reprinted with *Kind Heart's Dream*, as above).

CHEVALIER, shĕv'ȧ-lēr' (Fr., variant of *cavalier*, It. *cavaliere*, from ML. *caballarius*, horseman, from Lat. *caballus*, horse). In heraldry, a horseman armed at all points. In the more general acceptation it signifies a knight (q.v.). See BANNERET; CHIVALRY.

CHEVALIER, THE YOUNG. The popular title of the grandson of James II. of England, otherwise known as the Young Pretender (q.v.). See STUART, CHARLES EDWARD.

CHEVALIER, she-vȧ'lyȧ', ALBERT. An English music-hall singer, and composer of 'coster'-songs. He made his first public appearance in 1877, at the Prince of Wales's Theatre, during the Bancroft management, in *An Unequal Match*. For some years he continued as a regular actor, at the Court Theatre, with John Hare, and elsewhere, till in February, 1891, he made a great hit at the Pavilion Music Hall, developing his special gift of mimicking the traits of the London costermonger. This, and his songs, have brought him great popularity and financial success. In 1896 he spent some time in the United States, repeating his favorite performances. He is also the author of dramatic pieces, notably *Tommy Dodd*, which he produced at the Globe Theatre, London, in 1898.

CHEVALIER, MICHEL (1806-79). A French economist. He was born in Limoges, January 13, 1806, and was at the age of 18 admitted as a pupil of the Polytechnic School. Thence he went to the School of Mines, and some days before the Revolution of July he was appointed engineer to the Département du Nord. In early life he favored the views of Saint Simon, and his outspoken utterances led to his imprisonment. Upon his release he recanted, and was sent by the Government in 1832 to the United States to study the American railroad system. He traveled for two years in the United States, Mexico, and Cuba, and published the results of his experiences in a series of letters in the *Journal des Débats*. After his return he held various Government positions, and in 1845 he was elected a deputy, but served only till next year, his championship of free trade preventing his reëlection. He lost his professorship during the Provisional Government, but later won the favor of Louis Napoleon, and was reinstated. In 1860, after the conclusion of the commercial treaty with England, he became Senator. He died in Montpellier in 1879. Of his works, that most frequently quoted is his *Probable Fall in the Price of Gold* (1854). In it he calls attention to the effects of the gold discoveries in California and Australia, and urges that gold should be demonetized. Other works are: *Letters from North America* (1836); *Material Interests in France: Public Works, Roads, Canals, Railways* (1838); *Letters on the Organization of Labor and the Question of the Laborers* (1848).

CHEVALIER AU CYGNE, ō sē'ny' (Fr., knight of the swan). A character also known as Helias, occurring in the Icelandic Sagas, the legends of Germany and Flanders, and the early French romances. In the latter he is made grandfather to Godfrey de Bouillon. His name is more especially familiar as the title of a set of *chansons* composed shortly after the Crusades, among the individual titles of which are: "Antioche;" "Les Chétifs:" and "Les Enfances de Godefroy."

CHEVALIER DE MAISON ROUGE, de mȧ'zôɴ' rōōzh (Fr., knight of the red house). A novel by the elder Dumas, published in 1846 in Paris.

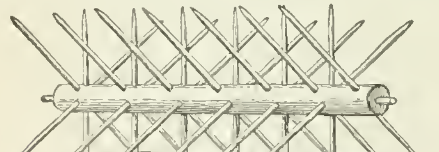
CHEVALIER DE SAINT GEORGE, de säɴ zhôrzh (Fr., knight of Saint George). A title assumed by the 'Old Pretender,' James Stuart.

CHEVALIER D'HARMENTAL, där'mäɴ'tȧl', LE (Fr., the knight of Harmental). A novel by Dumas père, published in Paris in 1843, and adapted for the stage in 1849. A share of the authorship of the work is to be ascribed to M. Auguste Maquet.

CHEVALIER D'INDUSTRIE, däɴ'du'strē' (Fr., knight of industry). A man who lives by expedients and trickery. The term is derived from a comedy in verse of that name by Alexandre Duval, in five acts, which was presented at the Théâtre Français, on April 3, 1809. The hero, Saint-Remi, is a *chevalier d'industrie*, who palms himself off as a gentleman of quality. The scene is laid in the home of a rich merchant, where, after a number of diverting escapades, Saint-Remi's roguery is finally exposed. It is one of the weakest of Duval's plays.

CHEVALIER SANS PEUR ET SANS REPROCHE, säɴ pẽr ȧ säɴ rȧ'prôsh'. See BAYARD, PIERRE DU TERRAIL.

CHEVAUX-DE-FRISE, she-vō'de-frēz' (Fr., horses of Friesland). An array of sharp or ragged points placed in a position toward the enemy and designed to stay his advance. They are usually made of wood or iron, and are as a rule a substitute for regular abatis. See ABATIS and FORTIFICATION.



CHEVAUX-DE-FRISE.

CHEVÊCHE, she-vĕsh', or **CIVET'TA**. The common names in France and Italy, respectively, of the 'little owl' (*Carine noctua*)—the bird of Pallas Athene, and hence the emblem of Athens, and associated with Minerva and the idea of Wisdom. See OWL, and Plate of OWLS.

CHEVEREL, shĕv'ẽr-el, Sir CHRISTOPHER and LADY. Characters in *Mr. Gilfil's Love Story*, a tale among George Eliot's *Scenes of Clerical Life*. It is at their country house that Mr. Gilfil first meets Caterina and learns to love her, in spite of her passion for the Cheverels' nephew.

CHEVERNY, she-vâr'nē', PHILIPPE HURALT, Count de (1528-99). A French statesman and author. He was born at Cheverny, in Brittany, and was appointed Chancellor in 1562, through the influence of Catherine de' Medici. Under her son, Henry III., he became Guard of the Seals (1578), and Chancellor of France (1581), but fell into disgrace by supporting the League, and was deprived of his post in 1588. In 1590 he was restored to favor by Henry IV., whom he served until his death. Count de Cheverny was the author of *Mémoires d'estat* (1636).

CHEVERT, she-vâr', FRANÇOIS DE (1695-1769). A French general. He was born at Verdun, and took part in nearly all of the important campaigns fought during the reign of Louis XV. Marshal Saxe placed him in command of the grenadiers at the battle of Prague, and Chevert and his sergeant, Pascal, were the first to mount the walls of the city. It was his skillful manœuvre also that decided the battle of Hastembeck, gained by Marshal d'Estrées over the Duke of Cumberland. He became lieutenant-general in 1748.

CHEVES, chēvz, LANGDON (1776-1857). An American lawyer and statesman, sometimes called 'the Hercules of the United States Bank.' He was born in Abbeville County, S. C.; was self-educated; was admitted to the Charleston bar in 1797, and rapidly rose to eminence as a lawyer. In 1808 he became Attorney-General of his State, and, after serving three terms in the South Carolina Legislature, was elected to Congress by the Young Republican Party in 1811. In Congress he was closely associated with William Lowndes, Henry Clay, and John C. Calhoun, and formed with them the celebrated 'War Mess.' He served as Speaker in 1814, and by his casting vote defeated the Dallas Bill for re-chartering the United States Bank. In 1814, refusing the Treasury portfolio in Madison's Cabinet recently vacated by Gallatin, he resumed the practice of law in South Carolina, and from 1816 to 1819 was one of the associate justices of the State. In January, 1819, he was elected one of the directors of the United States Bank, and in the following March was chosen to succeed Mr. Jones as president of that institution. The bank was then in a deplorable condition, and insolvency seemed almost inevitable; but Cheves set about restoring its credit, and, by continuing a previous policy of curtailing the note issues, by enforcing a rigid collection of all balances due from local banks, and by securing a loan of $2,000,000 in Europe, he fully accomplished his purpose within three years. In December, 1822, he resigned, and was succeeded by Nicholas Biddle (q.v.). Subsequently, until his death, he lived in retirement, first in Philadelphia, then in Lancaster, Pa., and finally in Charleston, S. C.; but in 1850 he went as a delegate to the celebrated Nashville Conference, where he expressed himself in favor of a Southern Confederacy, but strongly deprecated any independent action by separate Southern States. A brief account of his services to the United States Bank is given in the *Annual Report of the American Historical Association for 1896* (Washington, 1897).

CHEV'IOT HILLS. A mountain range in the counties of Northumberland and Roxburgh, on the English and Scotch borders, extending 35 miles, from near the junction of the Till and Tweed in the northeast, to the sources of the Liddel in the southwest (Map: England, D 1).

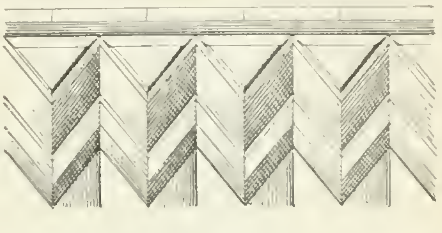
The highest point is Cheviot Peak, 2658 feet high. The Cheviot Hills are celebrated in the history and romance of border warfare.

CHEVREAU, she-vrō'. Henri (1823—). A French legislator. He was born in Belleville, Seine. He was one of the strongest supporters of the coup d'état of 1851. In 1870 he superseded Baron Haussmann as prefect of the Seine, and, after the first defeat sustained by the French Army in that year, was appointed Minister of the Interior. In this capacity he energetically promoted the organization of the Garde Mobile throughout the country, encouraging the formation of bodies of *francs-tireurs* (sharpshooters), and completing in Paris the equipment of sixty new battalions of the Garde Nationale. After the disaster at Sedan and the Revolution of September 4, he fled to Brussels, and subsequently rejoined the Empress Eugénie in England. He was elected a member of the Chamber of Deputies in 1885.

CHEVREUL, she-vrēl', Michel Eugène (1786-1889). A French chemist, born at Angers, in the Department of Maine-et-Loire. He studied chemistry in Paris, became assistant to Vauquelin, in 1813 was appointed professor of the physical sciences at the Lycée Charlemagne. In 1820 he was made examiner in the Ecole Polytechnique, and in 1824 director of the dyeing department in the Gobelin manufactory. In 1830 he became professor of applied chemistry in the Museum of Natural History, and in 1879 retired from active service. In recognition of his important services to science, many honors were conferred upon him; he was made a member of the Institute, a Fellow of the Royal Society of London, a Commander of the Legion of Honor, etc. In 1886 the centenary of his birth was celebrated with great enthusiasm; and in the same year Harvard University, on the 250th anniversary of its foundation, conferred upon him the degree of LL.D. A monument to his memory was erected at Angers in 1893. Another statue of Chevreul may be seen in the Museum of Natural History in Paris. Among his researches may be mentioned his successful investigation of the chemical nature of fats, which has led to the achievement of industrial results of the greatest importance. He was the first to demonstrate that the various fats are mixtures of glycerides, or compounds of glycerin with oleic, stearic, and palmitic acids. (See Fats.) He wrote: *Recherches chimiques sur les corps gras d'origine animale* (1823); *Considérations générales sur l'analyse organique et sur ses applications* (1824); *Leçons de chimie appliquée à la teinture* (2 vols., 1831); *De la loi du contraste simultané des couleurs et de l'assortiment des objets coloriés* (1839); *Théorie des effets optiques que présentent les étoffes de soie* (1846); *Des couleurs et de leur application aux arts industriels* (1864); *Résumé d'une histoire de la matière* (1878); etc. See Malloizel, *Œuvres scientifiques de Chevreul* (1887); also, Hofmann, "Nekrolog auf Chevreul," in the *Berichte der deutschen chemischen Gesellschaft*, for 1887.

CHEVREUSE, she-vrēz', Marie de Rohan, Duchesse de (1600-79). One of the foremost opponents to Richelieu at the Court of France. As the result of her activities, she was banished by the all-powerful Minister. Having returned, subsequent to the death of Louis XIII., from residence in England, she participated in the Fronde (q.v.). Consult the biography by Cousin (2d ed., Paris, 1852).

CHEVRON, shĕv'rŭn (Fr., Med. Lat. *capro*, rafter, from Lat. *caper*, goat). (1) In architecture, a molding in the form of a succession of chevrons (i.e. broken forms), otherwise called a zigzag molding. In general, it is characteristic of Norman architecture, but is also found in other European mediæval architecture. (2) In heraldry (q.v.), one of the charges known as ordinaries.



CHEVRON.

CHEVRONS. Badges or insignia of rank or service, consisting of stripes meeting at an angle, and worn on the sleeve of the coat by non-commissioned officers and men. In the United States Army, such badges of rank are worn by all non-commissioned officers, and are of cloth corresponding in colors and pipings to the patterns laid down for stripes on trousers. (See Uniforms, Military.) The chevrons are worn with the points up, though previous to 1902 they were worn with the points down, except by the cadet officers of the United States Military Academy and the non-commissioned officers of the United States Marine Corps. Chevrons worn by non-commissioned officers of the line, according to their rank, are as follows, those upon the overcoat being below the elbow, midway between the elbow and the end of the sleeve; those for the other coats being worn above the elbow: *Regimental sergeant-major*, three bars and an arc of three bars; *regimental quartermaster-sergeant*, three bars and a tie of three bars; *regimental commissary sergeant*, three bars and a tie of three bars, having a crescent (points front) three-quarters of an inch below the inner angle of the chevron; *squadron* or *battalion sergeant-major*, three bars and an arc of two bars; *chief musician*, three bars and an arc of two bars, with a bugle in the centre; *chief trumpeter*, three bars and an arc of one bar, with a bugle in the centre; *principal musician*, three bars and a bugle; *drum-major*, three bars and two embroidered cross-batons; *first sergeant*, three bars and a lozenge; *troop*, *battery*, or *company quartermaster-sergeants*, three bars and a tie of one bar; *sergeant*, three bars; *color-sergeant*, three bars and a star; *corporal*, two bars; *lance-corporal*, one bar; *stable sergeant*, *field artillery*, three bars and a horse's head. Post permanent staff, engineer, hospital, ordnance, and signal corps non-commissioned officers wear chevrons in which the stripes are accompanied usually by a cloth device designating the corps or department of the service to which they belong. See Military Insignia.

Service chevrons are worn by all enlisted men who have served faithfully for one term of enlistment, for either three or five years, and consist of a diagonal half-chevron of cloth of the color of the corps, department, or arm of service in which they have served, worn as a mark of distinction upon both sleeves of the dress coat below the elbow. *To indicate service in war*, a diagonal half-chevron of white cloth, with piping of the same color as the facings of the corps, department, or arm of service in which the soldier earned the right to wear it, is used; those for the engineers have in addition a stitching of white silk on each side of the chevron, which is worn on both sleeves of the dress coat. (For conditions under which service-in-war chevrons are worn, see UNIFORMS, MILITARY.) The chevrons to indicate service and service in war, if more than one, will be worn one above the other, in the order in which they were earned, one-quarter of an inch distance between them, and only for wars and such Indian campaigns as have been so designated by the Secretary of War in orders.

Chevrons of varying number and design are worn for the same reason and purpose in practically every civilized army, the English and French systems more closely approaching the United States than do the other nations of Continental Europe. Chevrons as badges of distinction were first introduced in the Prussian cavalry in 1889, and are worn by expert swordsmen. In France veterans and non-commissioned officers promoted for long service are called chevronnés. In England warrant and non-commissioned officers wear the badges similarly to the French, on the left sleeve of the coat, between the elbow and the shoulder. Four chevrons denote the rank of quartermaster-sergeant, three a sergeant, two a corporal, and one a lance-corporal of infantry, a bombardier of artillery, and a second corporal of engineers. They are worn point downward. Warrant officers (i.e. regimental sergeant-major or bandmaster) are distinguished, the former by a gold crown worn over the left cuff, and the latter by a gold lyre similarly worn. Chevrons for long service are worn by private soldiers on the right forearm, points upward. Chevrons for long service in the case of enlisted men or for rank in the case of non-commissioned officers below the rank of full sergeant are of cotton braid, the color of which is determined by the arm of the service to which the wearer belongs. Non-commissioned officers of sergeant's rank and upward wear gold chevrons.

CHEVROTAIN, shĕv'rō-tān' (Fr., from OF. *chevrot*, dim. of *chevre*, from Lat. *caper*, goat). A group (Tragulina) of diminutive, hornless, deer-like animals, the smallest known ungulates, which are intermediate in structure between pigs, camels, and deer, but resemble agoutis in form, standing only about 12 inches high. Several species inhabit southern India, Ceylon, and the Malayan region, and one inhabits the Philippines. These belong to the genus Tragulus, and the best known are the kanchil (*Tragulus kanchil*) of the Malayan Islands and the Indian chevrotain, or mouse-deer (*Tragulus memmina*), which differs from the others in being spotted with white. Usually the fur has some soft and beautiful hue of rufous, tawny, or mouse-gray. In West Africa is a related species, the 'biche cochon,' or 'water-deer' (*Dorcatherium aquaticus*), which is rich brown, with the back and sides spotted and striped. All are shy little creatures, walking with a queer, stiff-legged, tiptoeing gait, and hiding in thickets and rocky jungles, but capable of becoming gentle pets. These constitute the family Tragulidæ, which seems to be a scant survival of a group of forms widely distributed throughout all the temperate zone in Middle Tertiary times, and traceable to the same ancestry as the deer. See Plate of FALLOW DEER, MUSK, ETC., with DEER.

CHEV'Y CHASE (probably a corruption of Fr. *chevauchée*, raid; scarcely connected with Engl. *chevy, chivy*, to drive, from Gypsy *chiv*, goad). The name of perhaps the most famous of British ballads. It has been preserved in two forms, known severally as the Scotch version and the English version, of which the former is the older and the more imaginative. To the Scotch ballad there is a reference in *The Complaynt of Scotland* (1549), and apparently in Sidney's *Apologie for Poetry* (1595). The English poem, best known in England, was praised by Addison for its naturalness and simplicity (*Spectator*, Nos. 70, 74, 85), and continues to be a favorite poem. It is impossible to reconcile its incidents with history, but the event which is meant to be commemorated appears to have been the battle of Otterburn, in August, 1388—a fight which Froissart declares to have been the bravest and most chivalrous which was fought in his day. According to the ballad, Percy, surnamed Hotspur, vowed that he would enter Scotland, and take his pleasure for three days in the woods of his rival, and slay the deer therein at will. Douglas sent back word that he would prevent the sport. Accordingly, at the time of the hay harvest, Percy, with stag-hounds and archers, passed into the domains of his foe, and slew a hundred fat bucks. After the English had hastily cooked their game, Douglas, clad in armor, and heading his Scottish spears, came on the scene. Haughty challenge and defiance passed between the captains, and the battle joined. In the centre of the fray the two leaders met, and during the fierce combat an English arrow struck Douglas to the heart. "Fight on, my merry men all!" cried he, and died. Percy, with all the chivalrous feeling of his race, took the dead man by the hand, and vowed that he would have given all his lands to save him, for a braver knight never fell by such a chance. Sir Hugh Montgomery, having seen the fall of Douglas, clapped spurs to his horse, dashed on Percy, and struck his spear through his body a long cloth yard and more. When the battle ended, representatives of every noble family on either side of the Border lay on the bloody greensward. Consult "The Hunting of the Cheviot," in Child, *English and Scottish Ballads*, Vol. III. (Boston, 1878).

CHEW, BENJAMIN (1722-1810). An American jurist, born at West River, Md. He studied law in the office of Andrew Hamilton (q.v.) in Philadelphia, Pa., and afterwards in London; returned to Philadelphia in 1754, and was successively Register of Wills, Attorney-General, and Chief Justice of Pennsylvania. After the adoption of the Declaration of Independence he joined the ranks of the Loyalists, or Tories, resigned the Chief-Justiceship, and retired to private life. Stubbornly refusing to sign a parole, he was imprisoned at Fredericksburg, Va., in 1777. In the same year his elegant mansion (still known as the 'Chew House') in Germantown was badly damaged by the cannonading to which it was subjected during the battle of

Germantown, its occupation early in the engagement by the British, and the foolish attempt of the Americans to capture it, probably turning the fortunes of the day. (See GERMANTOWN.) Chew was president of the High Court of Errors and Appeals from 1790 until the abolition of this court in 1806.

CHEWING-GUM. A preparation of some form of gum resin, to which a flavoring matter is often added. The gum resin of black spruce (*Abies nigra*), in its original state, was probably first used for this purpose; but the demand is now supplied by various manufactured preparations, and spruce gum occurs less frequently than formerly. The gum resins of sweet-gum (*Liquidambar styraciflua*), tamarack (*Larix Americana*), and certain other forest trees are also used. The substance most extensively employed in the manufacture of chewing-gum is chicle gum, an elastic gum from the naseberry (*Achras sapota*), a tree found in Central and tropical South America, somewhat similar to the india-rubber tree. Balsam of tolu, which is prepared from a gum also found in South America, is a constituent of certain kinds of gum, while paraffin, or some preparation of it, has also been employed. To most of these gums it is customary to add sugar-water and some flavoring matter. The practice of chewing gum is probably harmless, and in mild cases of indigestion it may even be somewhat beneficial, by mechanically stimulating the flow of saliva. Pepsin and similar substances are often mixed in with the gum; but it is safe to say that the success of any particular brand depends more upon its sweetness and flavor than upon any beneficial properties.

CHEWINK′ (imitation of its cry), or TOWHEE. A large terrestrial finch of the genus Pipilo, represented by several species in North America, of which the common Eastern species, the red-eyed towhee (*Pipilo erythrophthalmus*), is best known. It is about 8 inches in length, of which the tail is nearly half. The male is black, with a white belly and chestnut sides, and with prominent white markings on the tail. The female is grayish-brown where the male is black. It is a migratory bird, wintering in the Southern States and breeding from Georgia northward. The nest is built on or near the ground, of bark and leaves, lined with grass, and usually most cleverly hidden by an apparently accidental roof of twigs, leaves, etc. Eggs, four or five, white, spotted with rufous. The chewink is an active bird, spending its time mostly on the ground in woods and thickets, scratching about in the leaves in search of its insect prey, and now and then flying to some low branch or convenient fence-rail to utter his melodious 'chewink'; or, in the spring, to pour forth a short but most musical song. The various names chewink, towhee, joree, etc., are in imitation of its sharp call-note, while 'ground-robin' refers to its colors, suggesting those of the American robin. See Plate of SPARROWS, and Plate of EGGS OF SONG BIRDS.

CHEYENNE, shī-ĕn′. The capital of Wyoming and county-seat of Laramie County, 106 miles north of Denver, Colo., on the Union Pacific, the Burlington and Missouri River, and the Cheyenne and Northern railroads (Map: Wyoming, G 5). It has a considerable trade in cattle and sheep, possesses large shops of the Union Pacific Railroad, and has lignite and iron mines in the vicinity. Among the prominent buildings are the State Capitol, the high school, Soldiers' and Sailors' Home, Carnegie Library, and the stone depot of the Union Pacific Railroad. The place was first settled in 1867, when the Union Pacific Railroad reached that point, and in 1869 was chosen as the Territorial capital of Wyoming. In the same year a large portion of the town was destroyed by fire. The government is administered under the charter of 1869, the year of incorporation, and provides for a mayor, chosen every two years, and a city council, elected by wards. The chief of police is appointed by the executive; the park and street commissioners are selected by the council; and all other administrative officials are named by the mayor, with the consent of the council. School officials are chosen by popular vote. Population, in 1890, 11,690; in 1900, 14,087.

CHEYENNE, shī-ĕn′ *or* shē-. A brave and warlike plains tribe of Algonquian stock. They lived at one time on the Cheyenne River, of Minnesota, but, owing to pressure from the hostile Sioux, crossed the Missouri and drifted down into the plains. They have an interesting social organization, with eleven subdivisions and a council of five chiefs, besides the military organization known to the whites as the 'Dog Soldiers.' They are high-spirited and honorable, and have been prominent in nearly all the wars upon the plains up to a very recent period. They call themselves by a name which signifies 'our people,' the name Cheyenne being of Sioux origin and signifying 'red'—i.e. 'alien.' They number now about 3450, of whom about 1400 (Northern Cheyenne) are on a reservation in Montana, the remainder (Southern Cheyenne) being associated with the Arapahoes in Oklahoma, their reservation having been opened to settlement in 1892.

CHEYNE, chā′nē, GEORGE (1671-1743). An English physician. He was born in Methlick, Aberdeenshire, studied in Edinburgh, and in 1702 went to London, where he was elected fellow of the Royal Society. He became enormously corpulent, and having secured relief by a milk and vegetable diet, recommended this treatment in all his subsequent treatises. His works, eminently argumentative in tone, were widely popular, and were translated into foreign languages. They include: *Essay on Health and Long Life* (1724; seventh edition, 1726); *The English Malady* (1733; sixth edition, 1739); and *Essay on Regimen* (1740). His correspondence with Richardson, the novelist, appeared in 1817, as *Original Letters, edited by Rebecca Warner.*

CHEYNE, THOMAS KELLY (1841—). An English biblical critic. He was born in London, September 18, 1841; took the degree of B.A. at Oxford, 1862; was fellow of Balliol College there, 1868-82; became Oriel professor of the interpretation of Holy Scripture, 1885; and Canon of Rochester, 1885. He was rector of Tendring, Essex, 1880-85; a member of the Old Testament Revision Company, and Bampton lecturer, 1889. He has attained great fame as an advocate of critical views in Old Testament learning. His publications include: *Commentaries* on Isaiah (1880-81; third edition, 1884), Jeremiah (1883-84), Hosea (1884), Micah (1882); a new translation of the Psalms (1884); and critical works, such as *Job and Solomon*

(1887); *Jeremiah, His Life and Times* (1888); *The Hallowing of Criticism* (1888); *The Origin and Religious Contents of the Psalter* (Bampton lectures, 1891); *Aids to the Devout Study of Criticism* (1892); *Founders of Old Testament Criticism* (1894); *Introduction to the Book of Isaiah* (1895); *The Christian Use of the Psalms* (1899); *Jewish Religious Life After the Exile* (1898). With J. S. Black he edits the *Encyclopædia Biblica* (1899 seqq.).

CHÉZY, shā'zā', ANTOINE LÉONARD DE (1773-1832). A French Orientalist, born at Neuilly. He was the son of Antoine Chézy, a well-known engineer. After studying for a while at the Ecole Polytechnique, he entered the Bibliothèque Nationale as librarian, in the department of manuscripts, and published a translation of Djami's poem, *Les amours de Medjnoun et Leïla* (1807). Besides his study of Persian, he devoted himself to Sanskrit, and a chair of that language was created for him at the Collège de France (1814). Among his works are an analysis of the *Meghaduta* of Kalidasa (1817); *La mort de Yadjnadatta* (1826); *La reconnaissance de Sakountala* (1830); and some fragments of Arabic, *L'anthologie érotique d'Amarou* (1831).

CHHATISGARH, chŭt'ēs-gär'. A division of the Central Provinces, British India (q.v.), comprising the districts of Raipur, Bilaspur, and Sambalpur, and several small feudatory States. Area, 25,013 square miles. Population, in 1891, 3,545,000; in 1901, 3,284,100.

CHIABRERA, kyá-brā'rá, GABRIELLO (1552-1637). An Italian poet, sometimes called the Italian Pindar. He was born at Savona, June 8, 1552. A posthumous child, he was educated under his uncle's care in Rome, where he afterwards lived many years; but having taken vengeance for an injury done him by an Italian nobleman, he retired to his birthplace, where he married at the age of fifty, and where he spent the rest of his life in independence and the tranquil enjoyment of literary pursuits. He died October 14, 1637. Chiabrera's poetical faculty developed late. He conceived a great admiration for Pindar and Anacreon, both of whom he strove to imitate, and successfully, as his contemporaries thought. Later poets and critics, such as Monti, Leopardi, and De Sanctis, are far from unanimous in their judgment of his verse, in which merit of form does not make up for paucity of ideas. His poems include several attempts at epics modeled on the *Æneid;* odes, canzoni, and canzonetti, the last being praised for their ease and elegance. The latest edition of his works was published in Milan (1807-08).

CHIAJA, kyä'yȧ, LA (dialectic form of It. *piazza*, place, park). A fashionable boulevard in modern Naples, extending along the coast for about a mile from the Largo Vittoria. Upon it is the Villa Nazionale.

CHIANA, kyä'nȧ. A river, the ancient Clanis, in central Italy, which once belonged entirely to the Tiber system. During the early Middle Ages, however, the mountain streams, with their deposits, converted the level, fertile valley into a swamp (which Dante spoke of as an accursed sink). Now, as the result of the drainage system planned by Torricelli and Viviani and fully carried out at the beginning of the last century by Count Fossombroni, the valley is one of the most fruitful districts in Italy. A water-shed is formed which sends the Chiana Toscana, or Maestro Canal, north into the Arno, and the Chiana Romana south into a branch of the Tiber at Orvieto. Among the lakes of the Chiana valley are Montepulciano and Chiusi.

CHIANTI, kyän'tê. A name applied to the mountain district in Tuscany, central Italy, about 30 miles southeast of Florence, which produces the red wine famous the world over as Chianti.

CHIAPA, chê-ä'pȧ, BISHOP OF. A title often applied to Bartolomeo de las Casas, the famous Spanish Dominican, who held that office between 1544 and 1547, and made every effort to ameliorate the condition of the Indians in Mexico and elsewhere.

CHIAPAS, chê-ä'pȧs (from the Aztec tribe of *Chiapanecs, Chapanecs*, or *Chapas*, who derived their name from Aztec *chapa*, red macaw). A Pacific State of Mexico, situated at the southeastern end of the country, and bounded by the State of Tabasco on the north, Guatemala on the east, the Pacific on the south, and the States of Oaxaca and Vera Cruz on the west (Map: Mexico, N 9). It covers an area of 27,222 square miles. In the southern part are a number of volcanoes, ranging in altitude from about 1500 to over 7000 feet, while the centre consists of a fertile plateau, the most cultivated portion of the State. The climate is moderate and healthful. The State produces corn, coffee, cocoa, sugar, tobacco, and indigo in small quantities, as agriculture is still in a backward condition; gold, silver, copper, and petroleum are mined. Near Palenque, one of the towns of Chiapas, are some of the most extensive and magnificent ruins in this portion of America. Population, in 1900, 365,216, chiefly aborigines. Capital, Tuxtla Gutierrez. Consult: Stephens, *Incidents of Travel* (New York, 1845); *The State of Chiapas* (Mexico, 1895).

CHIARAMONTE GULFI, kyä'rȧ-mōn'tȧ gōōl'fê. A town in the Sicilian Province of Syracuse, situated on a high hill, about eight miles north of Ragusa. The chief occupation is the cultivation of the vine. Population, in 1901, 10,548.

CHIARAMONTI, kyä'rȧ-mōn'tê, MUSEO. A division of the Vatican Museum, arranged in a corridor 900 feet long, containing some 300 marble sculptures.

CHIARI, kyä'rê (It., clear). A city in north Italy, 36 miles east of Milan (Map: Italy, D 2). It has silk-factories and tanneries. On September 1, 1701, the Austrians, under Prince Eugene, here defeated the French and Spanish, under Villeroi. Population, in 1881 (commune), 10,414; in 1901, 10,810.

CHIARI, GIUSEPPE (1654-1727). An Italian painter, born in Rome. He was a pupil of Carlo Maratta, whom he closely imitated, and under whose direction he executed many excellent easel-pictures. In addition to his many smaller works, which included sacred, historical, and mythological subjects, he painted some frescoes, notably an "Adoration of the Magi," in Santa Maria del Suffragio, Rome.

CHIAROSCURO, kyä'rô-skōō'rô (It., light and dark, from Lat. *clarus*, clear + *obscurus*, obscure). In painting, a most important quality, for without light and shade the sense of projection, rotundity, and corporeity cannot exist. But chiaroscuro is more than that element which gives volume to an object or group of objects; it is at its best that pervading sense of light which merges into shadow still carrying the qualities of light and color with it, so that the whole object may be homogeneous in color. Painters often fail to produce this effect, and the color of an object, after merging into shadow, loses in some hands, in the shadowed portion, the quality that rightly belongs to it. Chiaroscuro was used by Italian painters of the Renaissance, as by Raphael in his "Liberation of Saint Peter" (Vatican), but not generally until Correggio, the chief effect of whose paintings depends upon this quality, which he mastered with consummate skill. Among the Germans it was practiced especially by Grünewald. The second great master of this art was Rembrandt, into whose very depths of shadow we may look and still feel a sense of light reaching thither.

CHIASMA, kī-ăz′mȧ. See DECUSSATION.

CHIASMUS, kī-ăz′mŭs. See SYNTAX, FIGURES OF.

CHIASTOLITE, kī-ăs′tȯ-līt (from Gk. *χιαστός*, *chiastos*, diagonal, from *χιάζειν*, *chiazein*, to yawn, from *χῖ*, *chi*, name of the twenty-second letter of the Greek alphabet + *λίθος*, *lithos*, stone). A dark-colored variety of andalusite, consisting of stout crystals which, owing to a regular arrangement of carbonaceous impurities through the interior, show in cross-section a colored cross. This mineral is found in Andalusia, Spain, in Tyrol, in Saxony, in Austria, and elsewhere in Europe, where it is frequently sold as a gem, and, owing to the cross-like appearance, is prized, especially among the lower classes. In the United States the best chiastolites are found in Lancaster and Westford, Mass., and especially in Mariposa County, Cal.

CHIAVARI, kyä′vȧ-rē. A maritime city in Italy, 24 miles east-southeast of Genoa (Map: Italy, D 3). Numerous old towers, one of them of considerable size, are scattered through the town, which has a handsome new city hall, statues of Garibaldi and Mazzini, by Rivalta, attractive public gardens, good bathing, a technical and nautical school, and a gymnasium. It is a market for wine, oil, cheese, and fish, and manufactures lace, silk, and furniture, particularly the slender chairs called *sedi di Chiavari*. Chiavari is a starting-point for the ascent of Mount Penna; altitude, 5690 feet. Population, in 1881 (commune), 12,000; in 1901, 12,500.

CHIAVENNA, kyä-vĕn′nȧ (Lat. *Clavenna*, probably from *clavis*, key). A town in north Italy, picturesquely situated north of Lake Como, on the Mera, at the mouth of the Bregaglia Valley, through which passes the road to the Engadine. The beautiful Church of San Lorenzo has a campanile rising from an arcaded inclosure, and a baptistery containing a Thirteenth-Century font (Map: Italy, D 1). Interesting, also, are the ruins of an unfinished castle, and the Giants' Kettles (*marmitte dei giganti*), in the Capiola Valley. The chief trade is in fruit and wine, and the chief manufactures are silk, cotton, beer, and a coarse ware cut out of a soft stone found in the neighborhood. The situation made the ancient Clavenna one of the most important keys to the Alps. Population, in 1881 (commune), 4292; in 1901, 4788.

CHIBA, chē′bä. A prefectural town of Japan, situated on the coast, about 17 miles by rail from Tokio. It yields large quantities of marine products. Population, in 1898, 26,233.

CHIB′CHA, or MUYSCA (So. Amer. Indian, men). An important nation or confederacy centring, at the time of the Spanish Conquest, on the upper Magdalena River, about Bogotá, Colombia, their language being the general trade language throughout the whole mountain region of that country. Detached tribes of the same stock were found along the isthmus, and in Costa Rica. In culture the Chibchas ranked close to the Quichuas, practicing agriculture by the aid of an extensive system of irrigation, weaving cotton cloth, and working gold with a high degree of skill, although ignorant of the use of copper and bronze. They offered heroic resistance to the Spaniards, but were finally subdued and well-nigh exterminated, only a few remnants still surviving in their native mountains.

CHIBOUQUE or **CHIBOUK**, chĭ-bo͞ok′ (Turk. *chibuq*, small stick, tube of the pipe). A tobacco-pipe used in Turkey and Egypt, having a long wooden stem, often of valuable material, a mouthpiece of glass or amber, and a bowl of baked clay.

CHIC, shēk (Fr., probably from Ger. *Geschick*, fate, destiny, skill, dexterity, knack). A word in modern colloquial use, of foreign origin. The term is used in painting to express the art of giving efficiency in the most dexterous manner possible, with ability and adroitness closely united. The word is also employed in connection with fashion: and, spoken of in this sense, means style, manner, grace, and 'go.' Although of German origin, it has been received into general usage through the French, the language which fixed the present form of the word. See PSCHUTT.

CHICA, chē′kȧ (So. Amer.). A dye-stuff, which gives an orange-red color to cotton. It is obtained by boiling the leaves of a species of Bignonia (*Bignonia Chica*, Humb.), a native of the banks of the Cassiquiare and the Orinoco. The Indians use it for painting their bodies.

CHICA, chē′kȧ (So. Amer. Indian), PITO, POSO, or MAIZE BEER. A fermented liquor made from maize or Indian corn. It is much used in some parts of South America. See BEER.

CHICA (Sp., fem. of *chico*, small, from Lat. *ciccus*, trifle). A lively dance, popular in Spain and in South America as well; possibly of Moorish origin.

CHICAGO, shĭ-ka̤′gō. The county-seat of Cook County, Ill., the second city in population and importance of the United States, and the railroad centre and commercial metropolis of the West (Map: Illinois, E 2). It is situated on the southwest shore of Lake Michigan, at the mouths of the Chicago and Calumet rivers, in latitude 41° 53′ 6″ N., longitude 87° 38′ 1″ W.; distant 2417 miles from the Pacific coast, 911 from New York, 811 from Washington, and 915 from New Orleans.

DESCRIPTION. The city, one of the few great metropolises of the world built directly on a lakefront, extends along the lake for 24 miles, occupying, on a remarkably level site, an area of about 190 square miles, at a mean elevation of 25 feet above the lake and of 582 feet above sea-level. Within the municipal limits are several bodies of water, the largest of which—Calumet, Hyde, and Wolf lakes—are near the Indiana line, the last one lying partly in that State. Chicago was originally built on a flat prairie, which was but slightly elevated above the lake, and characterized by sand and swamp; but the grade of a large portion has been raised, block after block of buildings being lifted to the required level, streets elevated, and vast areas of solid masonry substructure laid.

Nature made of the lake-shore a level line of sand. The city's lake-front is protected south from Twelfth Street by the Illinois Central Railroad, and north from Twelfth Street to Chicago Avenue by the Government Pier, which protects the harbor. North from Chicago Avenue the Lake Shore Drive and Lincoln Park are secured by a massive sea-wall. Chicago is situated upon both sides of the Chicago River (q.v.), which, at a point little more than half a mile from its mouth, is formed by the junction of two streams or branches, one flowing from the northwest and the other from the southwest. The river and branches divide the city into three natural parts, legally known as the South, West, and North divisions. The South Division includes all the territory south of the main river, and the North Division the area north of the river; while the West Division comprises all that part of the city west of the two branches. These sections are connected by 60 or more bridges and several tunnels.

The bridges, of both the swinging and lift types, are operated mostly by steam, though with some of the more recent the motive power is electricity and compressed air. Grade crossings of the steam-railroads are obviated by numerous bridges, viaducts, and by track-elevation—the city containing more than twice as many miles of elevated tracks as are to be found in the combined mileage of all other cities in the United States. The street-railroad system, comprising cable, electric, and elevated roads, operates over 1000 miles of track. There are four elevated roads, having six terminal stations. There is a loop in the business centre, with stations two blocks apart, around which all trains must pass. These lines connect all parts of the city and suburbs, and are extremely efficient, the system probably being the best in the country. The various steam railroads, which have over 1500 miles of track within the city limits, offer additional transportation facilities; and a belt line, encircling the city on three sides, affords intercommunication between the many lines, and serves to unify the entire system.

The business centre is found wholly in the South Division, and extends from the river south to Twelfth Street. It contains the passenger-stations of several railroads, administration buildings, hotels, banks, commercial houses, Board of Trade, theatres, the newspapers, and the 'skyscrapers,' which have made of the Chicago office-buildings an architectural type. State, Clark, Dearborn, La Salle, Market, and Madison streets and Fifth and Wabash avenues are typical business streets, Fifth Avenue and Market Street being prominent centres of the wholesale dry-goods interests, and State Street the centre of the retail trade. In Chicago there has been a noteworthy development of the department store, establishments here ranking among the largest and most complete in the United States. Manufacturing establishments are found in various parts of the city, while the great live-stock and packing industry centres in the famous Union Stockyards, 475 acres in extent, some five miles southwest of the City Hall. On the waterways, among the objects of particular interest, are the great grain-elevators, of which there are thirty or more. The produce-market, South Water Street, presents a scene of great animation in the early hours of the day.

The streets, with few exceptions, cross at right angles, and are generally wide, some of the boulevards being 120 feet in width. Some of the long thoroughfares, notably Western Avenue and Halsted Street, nearly equal the length of the city. There are over 4000 miles of streets, over 1300 of which are paved, principally with wooden blocks, macadam, and asphalt, the mileage of the last-named material having increased rapidly in the last few years. Most of the main avenues are parallel with the lake. Of these, the Lake Shore Drive, Michigan, Drexel, and Grand boulevards, Prairie and Calumet avenues, Pine, Rush, and Cass streets, and La Salle Avenue, with Washington and Jackson boulevards running east and west, are conspicuous representatives of Chicago's more attractive residence avenues.

Detached houses mark the purely residence districts, which, together with the more recently acquired suburban areas where rural conditions to some extent still prevail, and the magnificent parks and boulevards of the public-park system, are noticeable in contrast with the congested business area, with its noise, dust, and smoke, and scattered tall office-buildings. Of these varying mammoth structures, the tallest reaches 21 stories in height, and the largest has a capacity for 6000 tenants. They are constructed of a structural steel frame with an exterior shell of masonry, generally of terra-cotta. For some time a municipal ordinance limited the height of buildings to 150 feet, but this restriction was removed in 1902.

Buildings. In the centre of the business quarter, and covering an entire square, is the Court-House and City Hall—a magnificent twin building of limestone, with fine granite columns, in a free rendering of French Renaissance, erected at a cost of $4,500,000. The east half is used for county purposes, and the west half by the city. In a space between the buildings is the Drake Fountain, with a bronze statue of Columbus, erected in 1892. On La Salle Street, running south from the City Hall, are some of the finest office-buildings. The Chamber of Commerce, one of the finest commercial structures in the world, costing more than $1,000,000, is 14 stories high, with a great central court roofed by an immense skylight, and a richly furnished interior. The Temple, of French-Gothic architecture, 13 stories high, consists of two great wings united by a narrow vinculum, forming interior courts which admit light and air. The first two stories are faced with red granite, the rest with red brick; and from the roof springs a bronze spire, 70 feet high, surmounted by a female figure. The Rookery, a Romanesque building of granite, brick, and terra-cotta, contains 600 offices. The Board of Trade, at the foot of La Salle Street, is a massive granite building. Other large structures

CHICAGO

HEART OF THE CITY (UPPER)
THE STOCKYARDS (LOWER)

on La Salle Street are the Tacoma, the Association, New York Life and Home Insurance buildings, and the Illinois Trust and Savings Bank, one of the finest banking edifices in the city.

The new Federal Building, 16 stories high, covers an entire block, 321 by 396 feet, bounded by Adams, Jackson, Dearborn, and Clark streets. The structure is of granite and steel, and is surmounted by a great dome. The original appropriation for the building was $4,000,000; and in 1903, $750,000 additional was voted by Congress to finish the interior.

In this vicinity are four great buildings, 16 stories high: the Great Northern Hotel and Theatre, the Monon, the Manhattan, and the Monadnock, costing $3,000,000, constructed of steel, and finished in granite and marble. Next to the last is the Union League Club, one of the most handsomely appointed club-houses in Chicago. West of the Federal Building, on Adams Street, is the Rand-McNally Building, well equipped, and one of the largest printing and publishing houses in the world. On the same street is the wholesale establishment of Marshall Field & Company, by Richardson—of note as a more attractive type of the commercial building, wherein purely commercial utility is not preëminent. At the corner of Monroe and Dearborn streets is the First National Bank, containing one of the largest banking rooms in the world. Dearborn Street is the site of several tall structures, among which the Unity, Hartford, Marquette, Old Colony, Manhattan, and Fisher buildings are prominent. Situated on one of the most busy corners in the heart of Chicago is the new 16-story building of the Chicago *Tribune*, one of the best examples of the growth of the æsthetic in Chicago. It is in the Italian style, being attractively built of Bedford stone, gray pressed brick, and terra-cotta trimmings. The corridors are floored in mosaics, with marble wainscoting. The woodwork is in mahogany throughout, and the floors of the office portions of the building are of polished oak. On State Street is the Spanish Renaissance Columbus Building, completed in 1893, at a cost of $800,000. It is 14 stories high, with a tower 240 feet high, tipped with a globe of opalescent glass, lighted by a powerful electric light. Over the entrance is a bronze statue of Columbus, and in the interior are two glass mosaics depicting scenes in his life. The retail house of Marshall Field & Company, on State, Washington, and Randolph streets and Wabash Avenue, represents the climax of Chicago's great buildings. There are in this structure over 1,000,000 square feet of floor-space, equivalent to 23 acres. The new granite addition of 12 stories erected upon the site formerly occupied by Central Music Hall, State and Randolph streets, rests upon 84 caissons of concrete, extending nearly 100 feet below the street-level. On one corner of Randolph Street is the Masonic Temple, the highest building in the city. Other structures of interest are the Fair, a building 190 by 350 feet, and 180 feet high, with a floor-space of 677,500 square feet; the building of Siegel, Cooper & Company, which affords 542,700 square feet floor-space; the Title and Trust Company Building, 16 stories high, which contains the Law Library of the Chicago Bar Association, and offices occupied mainly by lawyers; the Venetian and Reliance buildings; the Merchants' Loan and Trust Company Building, a 12-story structure of granite, finished in mahogany and marble; the publishing house of A. C. McClurg & Company; the Kimball Hall Building, a musical centre with 200 studios, a music-hall, and two recital-halls; the stately Schiller Building, containing the Dearborn Theatre, and halls, club-rooms, and offices; the new Ashland Block, built in classic style; and Bush Temple.

On Michigan Avenue and Congress Street is the Auditorium, built at a cost of $3,500,000, of granite and brick, 10 stories high, and extending, on the longest front, 360 feet. It contains a large hotel facing the lake, and a beautiful theatre. The tower, occupied by a station of the United States Weather Bureau, commands a magnificent view from its height of 270 feet. The main entrance, on Congress Street, leads through a beautiful court, splendidly decorated and with an elaborate mosaic floor, to the grand staircase of marble and bronze. The theatre, which seats 5000 persons, is luxuriously furnished and decorated with attractive mural paintings. The Fine Arts Building, Michigan Boulevard, is a centre of artistic, literary, and educational interests. It contains three auditoriums; Studebaker Hall, with a seating capacity of 1550; University Hall, with 703 seats; and an assembly room. North of it is the splendid Romanesque Chicago Club House, and farther north the Montgomery Ward Building, with a tower which rises above the roof of the Masonic Temple. On the Lake Front Park, at Adams Street, is the building of the Art Institute, 320 feet long and 208 feet wide, built of Bedford limestone in Greek style. The institution, dating from 1866, was known previous to 1882 as the Chicago Academy of Design. It contains a library and lecture-hall, and collections of great value, some of which are loaned, including paintings, sculptures (both originals and reproductions), textiles, and antiquities. Connected with the institute is a school of art instruction (see below). On the opposite side of the avenue, to the north, is the magnificent structure of the Chicago Public Library, built 1893-97. It is a successful rendering of the classic type of architecture, and cost $2,125,000. The interior is enriched with Sienna and Carrara marble, with 10,000 square feet of glass mosaic, and with beautiful frescoes, mottoes, etc. The library has been planned to accommodate 2,000,000 volumes, and an illustration of its extraordinary size may be found in the delivery-room, 139 by 49 feet. The building contains also a large G. A. R. Memorial Hall.

On the North Side, on Walton Place, is the Newberry Library, an imposing structure of steel and granite, which, when completed according to the projected plan, will occupy an entire square, and afford room for 4,000,000 volumes. Other institutions of allied character, which have noteworthy buildings, are the Chicago Historical Society, in a stone edifice at Ontario Street and Dearborn Avenue—the repository of a fine collection of paintings and interesting historical relics, and of a valuable library; and the Chicago Academy of Sciences in Lincoln Park. The buildings of the University of Chicago, of which twenty or more have already been erected, are planned to cover a plot of 40 acres, bordering the Midway Plaisance between Jackson and Washington parks. They are built principally of limestone, in Gothic type. Other notable buildings are the Union, the Chicago and Northwestern, Dearborn, and the Grand Central Railroad stations; and among ecclesiastical edifices are the Cathedral of the Holy Name (Roman Catholic), the Cathedral of Saint Peter and Saint Paul (Protestant Episcopal), and the Second Presbyterian, Plymouth (Congregational), Church of Christ (Christian Science), and the First Unitarian churches.

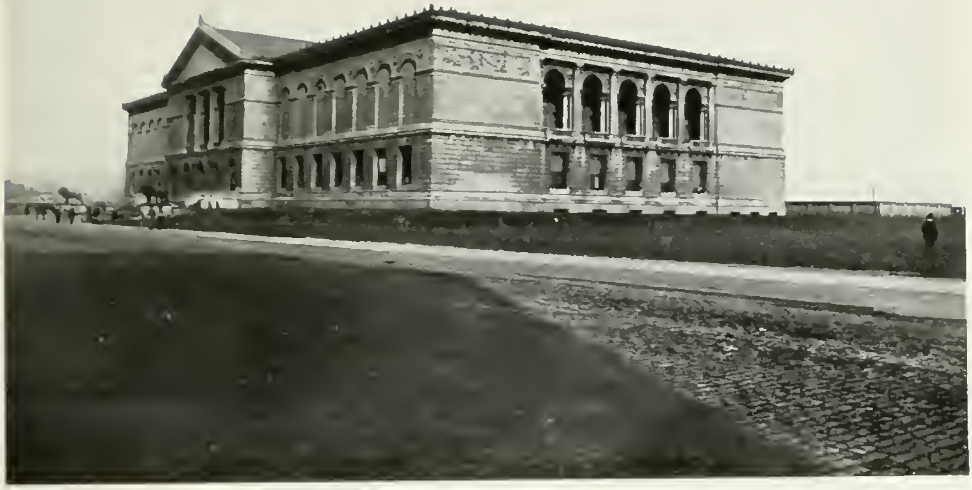
PARKS. Chicago has a splendid system of public parks, covering over 2200 acres, and connected by wide, level boulevards which have aided materially in making the greater Chicago an organic whole. There are about 40 parks, of which seven are of considerable extent. There are, in addition, numerous attractive playgrounds to meet the needs of great masses of children who were without convenient access to the parks. The principal parks are maintained by State funds, and are controlled by a Board of Commissioners for each division of the city, appointed by the Governor; the smaller areas are under municipal control. In the city there are about 45 boulevards, aggregating in length a total of 70 miles. These include the well-known Lake Shore Drive, Sheridan Road, Diversey Avenue, and Ridge Avenue boulevards in the North Division; Humboldt, Washington, and Jackson boulevards in the West Division; Michigan Avenue, Grand, Drexel, and Garfield boulevards in the South Division. The North Side park system centres in Lincoln Park (320 acres), one of the most beautiful in the city, with attractions in the way of a zoölogical collection, conservatories and gardens, and an electrically illuminated fountain. It has, also, statues of Lincoln and Grant (among the most notable of the city), of Linnæus, Schiller, and La Salle, and the Ottawa Indian monuments. Of the South Side parks, the Lake Front (210 acres), adjoining the business section on the east, is noteworthy, being on ground mostly reclaimed from the lake. It contains the Art Institute and the proposed site for the Field Columbian Museum, now in Jackson Park. Jackson Park (586 acres) has a world-wide reputation, having been the spacious site of the World's Columbian Exposition (q.v.), of which a few features remain, the most important being Field Columbian Museum. It was the Fine Arts Building of the Exposition, has a library and scientific collections, and is endowed with $1,500,000. The famous Midway Plaisance (80 acres) leads from Jackson Park past the buildings of the University of Chicago to Washington Park (371 acres), noteworthy for its trees and flowers. The West Side Division has a total park area of 625 acres, including Douglas Park (179 acres), Garfield Park (185 acres), and Humboldt Park (200 acres), all of which contain lakes and special features. In the last-named park is located a fine monument to Humboldt. The distribution of smaller parks and squares throughout the city adds to the effectiveness of the system.

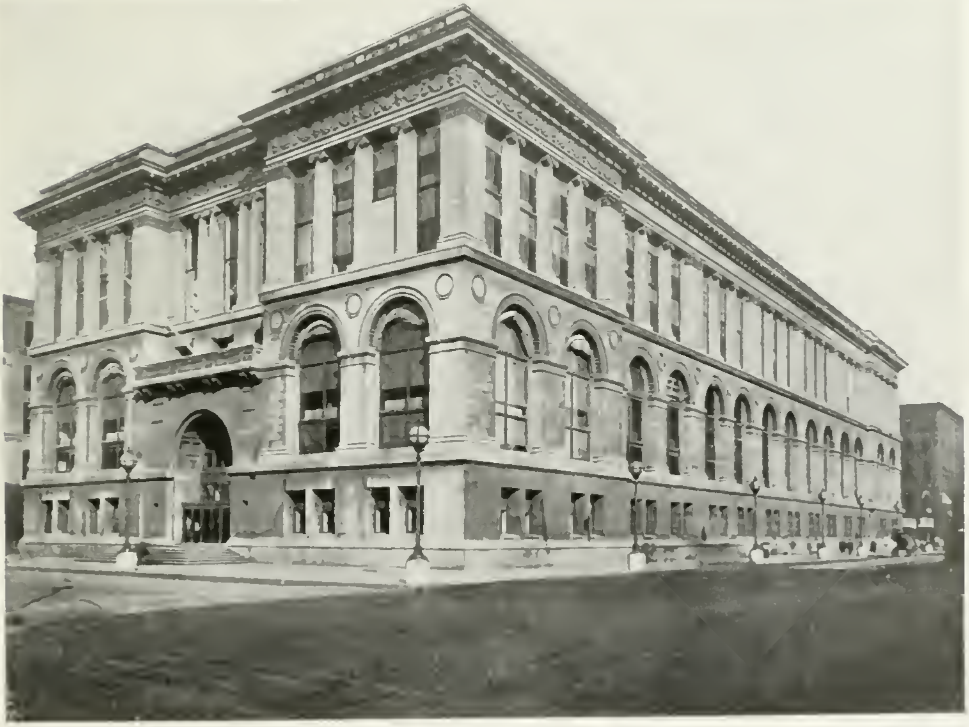
Other notable monuments of the city are the mausoleum and statue of Stephen A. Douglas in Douglas Monument Square; an equestrian statue of General Logan in Lake Front Park; the Police Monument, in Union Square, commemorating the victims of the Anarchist riot of 1886; and the Confederate Monument in Oakwoods Cemetery. At the end of Michigan Avenue, a tablet marks the site of Fort Dearborn. There are several cemeteries within the city limits. Of these, Graceland and Rosehill, in the North Division, are worthy of particular mention for beauty.

EDUCATIONAL INSTITUTIONS. Chicago has a carefully planned system of public-school education. In 1847 there were four schoolhouses in Chicago, built at a cost of $5000 each—two-story brick buildings with an assembly-room and four classrooms on each floor. The educational department in 1902 comprised 15 high schools, including English high and manual training schools, and 233 elementary schools, besides a normal school, a reformatory school, a parental school, and institutions for the deaf. The course of elementary instruction inclines to the English public school and the Continental (lycée and gymnasium) systems wherein Latin is offered at an early period. The study of German is introduced as an elective in the grammar grades on account of the large number of Germans in the city's population. Manual training is provided for boys of the seventh and eighth grammar grades, and household training—cooking and sewing—for girls of the same classes. The programme is purely elective for those who are not candidates for graduation.

The school year of 1900-01 closed a decade of remarkable growth. During this period the school population increased from 329,796 to 626,516, or 90 per cent.; while the attendance in the private and parochial schools only increased from 61,916 to 84,737, or 36 per cent. At a total expenditure of $8,855,000 there were erected 103 new buildings. The number of teachers increased from 3,300 to 5,951, or 80 per cent.

The higher educational institutions are the University of Chicago (q.v.); Saint Ignatius's College (Roman Catholic); the Northwestern University (Methodist Episcopal), at Evanston, whose professional schools, excepting the Garrett Biblical Institute, are in Chicago. The Chicago (Congregational), Chicago Lutheran, McCormick (Presbyterian), and Western (Protestant Episcopal), are theological seminaries. There are several medical schools, the most prominent of which are the College of Physicians and Surgeons, the Rush, the Homœopathic, the Hahnemann, and the Bennet; several schools of law; also dental colleges, colleges of pharmacy, training-schools for nurses, and a veterinary college, art schools, and schools of music. In the educational work of the city, a prominent place is occupied by the Art Institute, the numerous classes of which are as free as practicable, and are attended by 1000 or more students. Its Art School, which is self-supporting, offers one of the most complete courses in America; besides the usual branches of art, prospective and mechanical drawing, ceramics, and the modeling of ornament are taught by a large staff of professors. There are a year's traveling scholarship in the department of drawing and painting, and two annual scholarships for women. The library and gallery of the museum, as well as the lectures, are open to all students. The fee is from $5.00 to $25.00 for a term of 12 weeks. The Armour Institute of Technology, similar in scope to the Pratt and Drexel Institutes, has been enlarged since its inception in 1893 to include, besides manual and technical training, various courses in engineering, architecture, and science, leading to the degree of B.S. The Lewis Institute, opened in 1896, is an institution for the practical training





CHICAGO

THE ART INSTITUTE (UPPER)
THE PUBLIC LIBRARY (LOWER)

of poor young men. The Chicago Athenaeum is a private philanthropic institution, maintaining daily and nightly sessions for a considerable part of the year, to which students are admitted at any time on payment of a nominal tuition fee. It has also a library and reading-room.

Libraries. Chicago has three great libraries, besides that of the University of Chicago. The Public Library, with over 300,000 volumes, founded in 1872, has one of the largest circulations in the country, and maintains 50 or more delivery stations at various points in the city. The Newberry Library is a reference library, containing notably fine collections on music, medicine, and religion. The John Crerar Library, which occupies temporary quarters until its permanent home shall be erected in the South Division, is endowed with $2,500,000, and has valuable works on natural, physical, and social science. Accessions to these libraries are made with reference to the other book collections in the city, thus affording opportunity for a wide range of study. The library of the Chicago Law Institute is large and valuable, and the Chicago Historical Society has a fine collection of Americana. There are also the libraries of the several educational institutions, and of the Chicago Academy of Sciences and the Field Columbian Museum.

Charitable Institutions. The city contains a great number of hospitals—the largest being the Cook County Hospital; the Presbyterian; the United States Marine Hospital, one of the largest of its kind in the country; Saint Luke's and Saint Joseph's Hospitals; the Women's Hospital; and the Hospital of the Alexian Brothers. There are many dispensaries, asylums, and homes, day nurseries, reformatories, and relief societies. One of the most interesting institutions is the Armour Mission (non-sectarian), the object of which is industrial, mental, and religious training. It is maintained as a memorial to Mr. Joseph Armour. The oldest and most influential of the social settlements of the city is Hull House, modeled after Toynbee Hall, London, and situated in the slum and Ghetto district on the West Side. Next in order of importance are Chicago Commons, also on the West Side; Northwestern University settlement, in the northwestern section of the city; and the University of Chicago settlement, in the stockyards district. These settlements are contiguous to or are surrounded by foreign colonies. The Chicago Bureau of Justice employs legal talent in aiding the poor to recover just wage-claims. The Bureau of Associated Charities carries on a worthy work by means of its summer camps and outings; and the Chicago Charity Organization Society, made up of representatives from the various allied organizations, exercises to some extent a centralized power by virtue of its general supervision.

Theatres, Clubs, Hotels. There are numerous first-class theatres and places of amusement in Chicago. The leading play-houses are the Auditorium, Bush Temple, Chicago Opera House, Dearborn, Grand Opera House, Great Northern, Illinois, McVicker's, Powers, and Studebaker.

The leading clubs are the Argo, Athletic, Calumet, Chicago, Illinois, Iroquois, La Salle, Marquette, Standard, Union, Union League, the Chicago Women's Club, and the Woman's Athletic Club. The Calumet, Chicago, Athletic, and Union League have magnificent club-houses.

Chicago is known as a great convention city. Its hotel accommodations, which were increased considerably for the World's Fair, are very extensive. Among the most prominent hotels are the Auditorium, with a large annex; the Great Northern, Metropole, Palmer House, Grand Pacific, Wellington, Lexington, Victoria, Virginia, and the Sherman House.

Commerce and Industry. The secret of Chicago's rapid development is found in its commanding position relative to an extensive and phenomenally productive region. Situated at the southern end of Lake Michigan, the city enjoys the navigable facilities of the Great Lakes, while the railways crossing the country from the East to the Northwest naturally touch here. The Southern lines, connecting with the Great Lakes, also find it a natural terminal point. Chicago, the greatest railway centre of the United States, is therefore of first importance as a collecting and distributing centre. The numerous railways converging in and tributary to the city operate 120,000 miles of line, two-thirds of the total mileage of the United States. These connections reach every State of the Union; also Canada and Mexico. The railways are supplemented, too, by lake navigation. Lines of steamers connect Chicago not only with the Northern States and Canada, but with the outside world. The importance of this outlet has greatly increased with the recent improvements in canals at different points, ocean vessels now making their way to Chicago. Many difficulties still beset this branch of transportation, however, and its practicability on an extensive scale is yet to be determined. Perhaps the possibility of uniting Chicago with the Gulf of Mexico is equally significant. It is estimated, indeed, that the new sewerage canal connecting Lake Michigan with the Mississippi River represents two-thirds of the work necessary to make of it a ship canal.

The port of Chicago owes much to the presence of rivers. The mouth of the Chicago River, formerly a sluggish bayou, has been deepened by piers that extend into the lake, leaving an entrance-way about 500 feet wide; while long breakwaters on the east and southeast, constructed by the United States Government, form an outer harbor with an average depth of 16 feet, and an area of about 455 acres. Additional protection to vessels is given by an exterior breakwater, 5436 feet long, which extends in a northeasterly direction about a mile from the river's mouth. In South Chicago, at the northern mouth of Calumet River, is another harbor, 300 feet wide between piers. The Illinois and Michigan Canal, constructed in 1836-48, connecting with the Mississippi and its affluents, is no longer an important means of transportation. This canal extends to La Salle, the head of navigation on the Illinois. It is 96 miles in length, and at its highest level was originally 12 feet above the lake; but in 1866-70 the city deepened it, so that it is now 8½ feet below the ordinary level of the lake.

The tonnage of vessels arriving at Chicago in 1900 was 7,044,000, as against 4,616,000 in 1880. This places Chicago next to London, New York, and Antwerp as a commercial port. There is a decided increase in the average tonnage of vessels frequenting Chicago, as is evident from the fact that during the above period the number of vessels decreased from 13,218 to 8714. Foreign exports by lake increased from $3,900,000 in 1891 to $9,926,000 in 1898. Over half of this amount is represented by corn, wheat being the next item. The largest lake import is lumber. The vastness of the forests to the north, and of the farming interests of the surrounding region, gives Chicago precedence over all other markets in lumber, grain, and live stock. For thirty years the annual imports of lumber have exceeded 1,000,000,000 feet, and in certain years have doubled that amount. About one-half of this import has been, in turn, shipped to other points. The trade in lumber products has shown, in recent years, some tendency to decline. The imports of grain in 1900 amounted to 307,000,000 bushels, besides 9,300,000 barrels of flour. In these products Chicago has exceeded Minneapolis, Duluth, Milwaukee, and Saint Louis combined. There is a marked increase in the importation of corn and oats. For the decade ending with 1900, the annual importation of hogs has averaged over 8,000,000 head, and of cattle and sheep over 3,000,000 each. There has been, recently, a large increase in the importation of butter and dairy products—the imports of butter for 1900 being 244,000,000 pounds.

As a natural consequence of being a collecting and distributing centre, Chicago has developed an extensive manufacturing industry. According to the census of 1900, the manufactured products reached a total value of $888,786,000, and there were 262,600 wage-earners employed—an increase of 37.8 per cent. during the decade. A large per cent. of the live stock received in Chicago is slaughtered and packed there, the total value of these packing-house products in 1900 being $248,811,000. For two decades the average number of hogs packed annually has been about 5,000,000 head. This is considerably over a third of the total number packed in the West during that period. Over 25,000 men are employed in the industry. Every part of the slaughtered animal is utilized, thus giving rise to the manufacture of important by-products (such as soap and candles), the value of this product alone in 1900 being over $9,000,000. The tanning of leather is of almost equal importance.

The convenient location of Chicago with respect to the coal-fields of Illinois and the iron-ore regions of Lake Superior contributes greatly toward the industries which depend upon these two supplies. The iron and steel products in 1900 reached a value of $31,461,000, while the foundry and machine-shop products passed $44,561,000. The demand of the surrounding region for agricultural implements gives rise to another important branch of manufacturing. The output of agricultural implements in 1900 amounted to $24,848,000. Chicago is a centre for the manufacture of harvesting machines. The McCormick, and the Deering Harvesting Machine Works are the two largest harvesting machinery manufactories in the world. The former's area is 150 acres. Being a lumber-market, the city has developed extensive manufactures of lumber, the value of the manufactures of furniture being estimated at $12,344,000, and the lumber and planing mills products at $7,530,000. Owing to Chicago's prominence as a railroad centre, the manufacture of dependent products is naturally great. The products itemized in the census report as "Cars, steam-railroads, not including operations of railroad companies," amounted to $19,108,000, and the "Cars, and general shop construction and repairs," to $8,145,000. Chicago is the leading clothing manufacturing centre of the West, the total product in 1900 exceeding $57,000,000 in value. A like position is held in the printing and publishing business, this output in 1900 being estimated at over $32,000,000. There is also a long list of other important manufactures—electrical apparatus, bicycles, tricycles, roasted and ground coffee, etc.

Government. The Constitution of Illinois provides for uniformity in the government of municipalities, prohibiting special legislation. Chicago is, accordingly, governed by a general act of the Legislature passed in 1875, and by such subsequent acts as have in some measure modified the original act. The council is unicameral, with 70 elected members, there being two from each of the 35 wards. An elected mayor presides at the meetings of the council, and has a vote in case of a tie. He also has a veto, which may be overridden, however, by a two-thirds vote of the council. Some of the powers vested in the council have been delegated by it to special departments—i.e., police department, etc. These departments are in the hands of single commissioners, who are appointed by the mayor, and whose terms of office expire with the term of the mayor (two years). The mayor is further fortified with the power to remove these commissioners; but such act may be disapproved by a two-thirds vote of the council. The legislative function of the school department is intrusted to a board of education of 21 members, who are appointed by the mayor and confirmed by the council. The trustees are appointed for a term of two years, and serve without pay. Civil-service methods prevail in the administration of affairs, the regulations being prescribed by the State Civil-Service Commission. Owing to prohibitive legislation, the township and county government still exists. Township officers are elected in town-meetings, as in the rural districts, and the county elects a board of commissioners. These organizations are an important factor in the financial affairs of the city.

The city owns and operates its water-works system and electric-light plant. The water-supply is obtained from Lake Michigan, cribs having been located at a distance of from two to four miles from the shore, in order to secure uncontaminated water. It is conveyed to the city by means of underground tunnels. Notwithstanding this precaution, there was evidence that the drainage of the city into the lake affected the quality of the water, and consequently the municipality was induced to construct the greatest sanitary engineering work of the country—the Chicago Drainage Canal (q.v.). It was built with a view to ship navigation. When the Illinois River shall have been improved, access to the sea through the Mississippi will be assured.

Finance. The per capita receipts and expenditures of Chicago are low when compared with those of other large cities, and it suffers from inadequate funds, as the State Constitution places a limit upon tax-rates. In 1898 a new revenue law was passed, creating a Board of Assessors which levies assessments for the entire county of Cook. Subsequent legislation abolished the numerous offices of Town Collectors and made the County Treasurer ex-officio collector for all the towns. The municipality is compelled to resort in an unusual

For places outside of territory covered by this map see general map of Chicago.

PROMINENT INSTITUTIONS AND BUILDINGS.

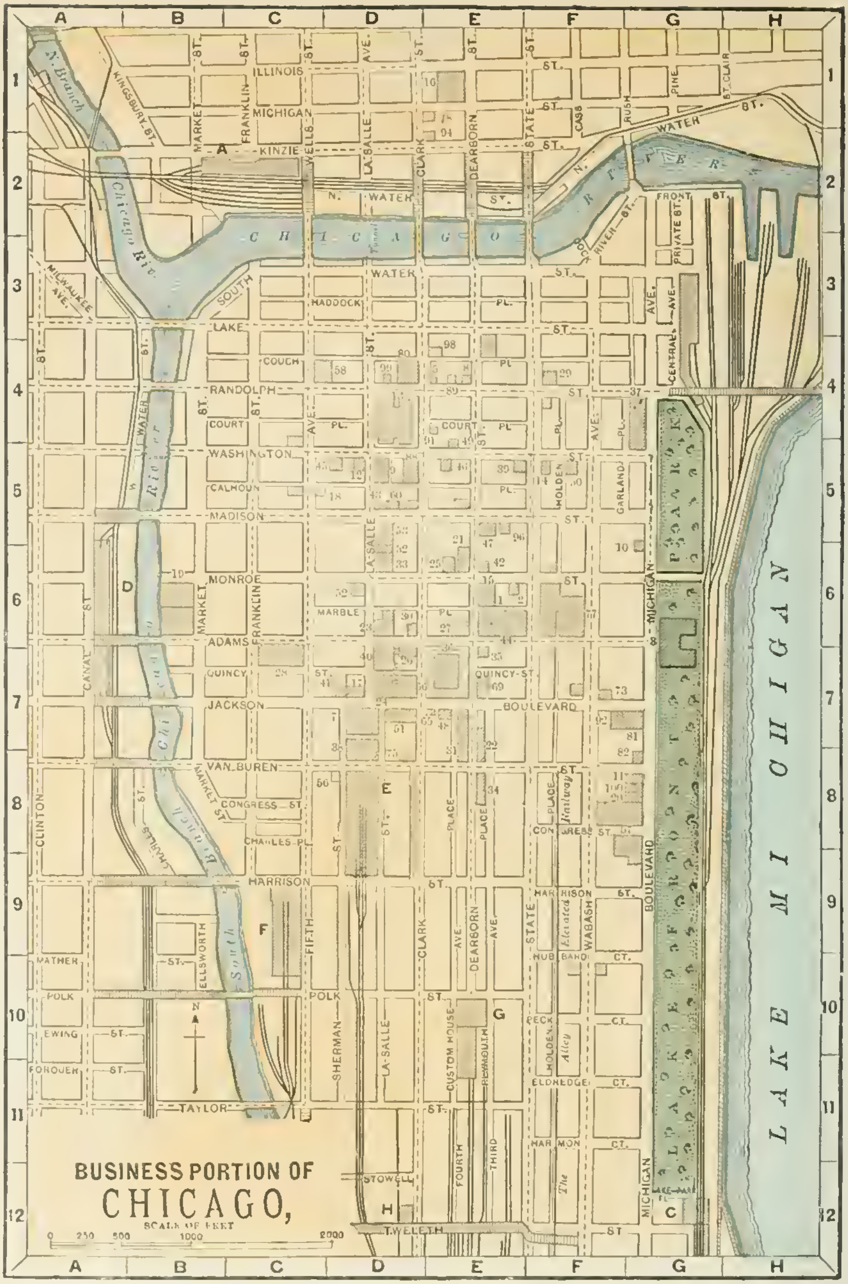
1. Adams Exp. Bldg.E6
2. American Ex. Co..E6
3. Art Institute..... .G6
5. Ashland Block E4
7. Board of Trade....D7
8. Borden Block......E4
9. Chamber of Com..D5
10. Chicago Ath. Club G6
11. Chicago Club......F6
12. Chicago Stock Exchange Bldg..D5
13. City Hall..........D4
14. Columbus Memorial Building.....F5
15. Com. Nt. Bk. Bldg.E6
16. County Jail........E1
17. Counselman Bldg. D7
18. Daily News........D5
19. Farwell Building..B6
20. Fine Arts Building.G8
21. First Nt. Bk. Bldg.E6
22. Fisher Building....E7
23. Home Ins. Bldg. ..D6
24. Illinois Trust and Savings Bldg....D7
25. Inter-Ocean Bldg..E5
26. Lakeside Bldg.....D7
27. Marquette Bldg....E6
28. Marshall, Field & Co.'s Wholesale Building.. ......C7
29. Masonic Temple...F4
30. Merchants Loan & Trust Co.........D6
31. Monadnock Bldg ..E7
32. National Life Bldg.D6
33. N. Y. Life Bldg....D6
34. Old Colony Bldg...E8
35. Owings Building...E7
36. Post-Office.........E7
37. Public Library G4
38. Rialto Building....D7
39. Reliance Building..E5
40. Rookery Building..D7
41. Royal Ins. Bldg....D7
42. Stock Exchange...E6
43. Tacoma Building .D5
44. The Fair.... ......E6
45. Times Herald Bldg.C5
46. Title & Trust Bldg.E5
47. Tribune Building..E5
48. Union League Clb.E7
49. U. S. Express......E5
50. Venetian Bldg.....F5
51. West. Union Bldg..D7
52. Woman's Christ'n Tem. U. Temple.D6
53. Y. M. C. A. Bldg...D5

HOTELS.

56. Atlantic Hotel.....D8
57. Auditorium Hotel and Annex......F8
58. Briggs House. D4
60. Brevoort House....D5
65. Graco Hotel. E7
66. Grand Pacific......D7
69. Great Northern....E7
73. Hotel Wellington..F7
75. McCoy's Hotel.....D8
77. Palmer House. F6
78. Revere House. E1
80. Sherman House. ..D4
81. Stratford House...F7
82. Victoria Hotel.....F8

THEATERS.

57. Auditorium. F8
88. Chicago Op. Hou..D5
89. Dearborn Theater.E4
91. Grand Op. House..E5
92. Illinois Theater....F7
96. McVicker's Thea...E5
98. Olympic Theater..E4
99. Powers Theater....D4
100. Studebaker Thea.G8



A.	Chicago & Northwestern..	C2
C	Illinois Central. ... . Cleveland, Cincinnati, Chic. & St. Louis, Wisconsin Central.. .... Michigan Central....................... Pere Marquette........................	G12
D.	Chicago & Alton .... Chicago, Burlington & Quincy............... Chicago, Milwaukee & St. Paul............. Pittsburg, Cincinnati, Chic. & St. Louis. Pittsburg, Fort Wayne & Chicago.........	A6
E.	Chicago, Rock Island & Pacific .... Lake Shore & Michigan Southern........... New York, Chicago & St. Louis............	D8
F.	Baltimore & Ohio................................. Chicago Great Western .... Chicago Terminal Transfer.....................	C9
G.	Atchison, Topeka & Santa Fe................. Chicago & Eastern Illinois... .... Chicago & Western Indiana................... Chicago, Indianapolis & Louisville... .. Chicago & Erie Railroad.... .... Grand Trunk Western............................ Wabash	E10

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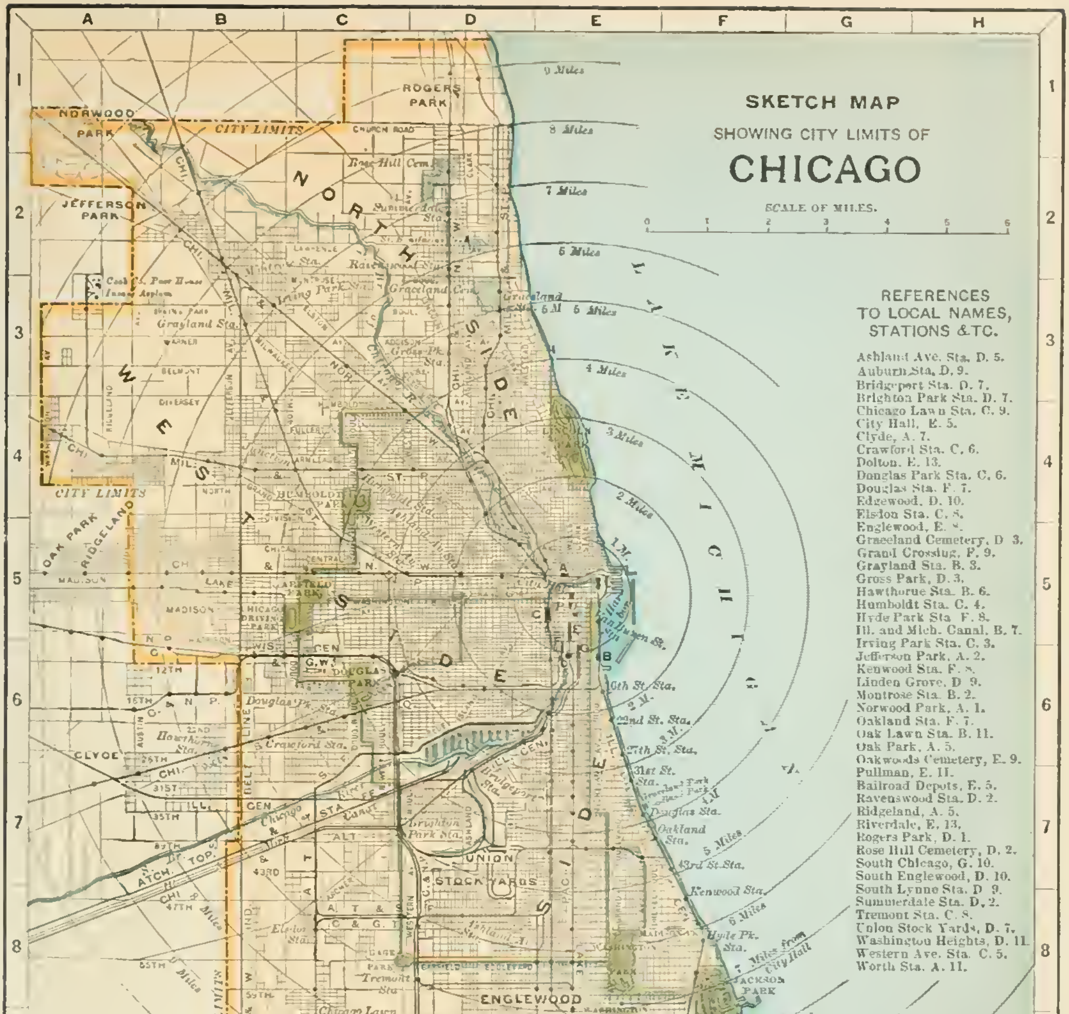

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degree to indirect taxes—such as licenses, fees, fines, etc. Property, real and personal, is now assessed on the basis of 20 per cent. of its full value. The budgets are determined by committees of the council. The total debt is $35,164,000, or the comparatively modest per capita amount of $19.42. The following are the principal items of the receipts and expenditure for the year 1900: The actual income was $26,867,000, of which $14,295,000 was from property tax, and over $3,000,000 each from liquor licenses, waterworks, and special assessments. The total expenditure, including loans repaid, was $22,673,000, of which $19,518,000 was for maintenance and operation—the largest items being: Schools, $6,200,000; police department, $3,773,000; fire department, $1,617,000; interest on debt, $1,313,000; and water-works, $1,240,000. There are certain items of county and township government not herein included—e.g. the county maintains the charitable institutions at an annual cost of $800,000.

Population. No other city has attained anything like the magnitude of Chicago in so short a time. With but 4470 inhabitants in 1840, the city had increased in 1870 to 298,997, ranking fifth among American cities; in 1880, to 503,185, ranking fourth; in 1890, to 1,099,850, standing second; in 1900, to 1,698,575, still holding second place. Greater New York alone had as great an absolute growth during the last decade; but New York's per cent. of increase was much less. Chicago's phenomenal growth seems quite natural, however, when compared with the development of the 'Great West,' of which it is a part. Chicago has a remarkably high per cent. (34) of foreign-born population, and of the native-born, 59 per cent. are of foreign parentage. Of the foreign nationalities the Germans are most numerous, aggregating more than twice the number of Irish—the latter having shown a decided inclination to remain in the Eastern towns. Chicago contrasts also with Eastern cities in that it has a large number of Swedes and Norwegians, Bohemians, Poles, and Canadians, while the number of Italians, Russians, and Austrians is comparatively small. The negro population is given at 30,150. Certain of the foreign nationalities, notably the Germans and Swedes, are well distributed over the city; others tend to congregate in limited districts which are overcrowded—chiefly those adjoining the central business section of the city. Chicago boasts of the healthfulness of its situation and sanitary conditions, having the lowest death-rate (14.68) of any of the large cities in the United States.

History. The name 'Chicago' is probably derived from an Indian word meaning 'wild onion'—a plant which grows abundantly in this locality. Before the coming of the whites, the place was a rendezvous for various Indian tribes, and a favorite meeting-place for voyageurs and traders. In 1673 both Marquette and Joliet stopped here for a few days, and the former spent most of the winter of 1674-75 here. Later, the locality was visited by La Salle, Hennepin, and others; and on a map (Franklin's) published in Quebec, in 1685, it was designated as Fort Chicagou, which would seem to indicate the existence thus early of a trading-post.

Jean Baptiste Point de Saible, a mulatto refugee from Haiti, who came about 1779, is generally considered the first settler. In 1796 he sold his cabin to Le Mai, a French fur-trader, who in turn sold out early in 1804 to John Kinzie, the first white man of American birth to make his home here. The military importance of the place was quickly recognized by the Government, which in 1795 forced the Indians to cede a tract of land "six miles square at the mouth of the Chicago River," and late in 1804 erected Fort Dearborn (q.v.) on the south bank of the river, near its mouth. On August 15, 1812, in accordance with orders received several days earlier, Captain Heald and the garrisons evacuated this fort, but were ambushed by their Miami escorts and other Indians, and 38 soldiers, two women, and 12 children were killed, and many others captured. On the following day the fort was burned, but it was rebuilt in 1816. In 1830 the town was laid out, and the first map, dated August 4, gives its area as three-eighths of a square mile. There were then twelve families here, besides the garrison. Three years later Chicago was incorporated as a town, its population being 550, and its area 560 acres; and in 1837, then having 4170 inhabitants, it was chartered as a city. In 1833, 7000 Indians assembled here and sold a large tract of land in this vicinity, agreeing to move across the Mississippi. This they did two years later; and the fort, being no longer necessary, was abandoned in 1837 and demolished in 1856.

The Illinois and Michigan Canal, begun in 1836, was finished in 1848; and in the same year the first railroad, the Chicago and Galena Union, was completed. Four years later the Michigan Southern and the Michigan Central, the first roads leading to the East, entered the city, which from this time grew with unprecedented rapidity. In 1860 the Republican National Convention, by which Lincoln was nominated, was held in Chicago. In October, 1871, the most destructive fire in the history of the country occurred here. Breaking out in a barn in De Koven Street, and fanned by a gale, it spread with the greatest rapidity, and raged uncontrolled for two days and nights, sweeping over 2100 acres, destroying 17,450 buildings, and causing 200 deaths, besides the greatest destitution and suffering. Out of a population of 324,000, more than 70,000 were rendered homeless, and almost one-third of the property in the city ($190,000,000 out of $620,000,000) was destroyed. Relief poured in from all sides, $7,000,000 being quickly contributed in Europe and America, and within a year the city was largely rebuilt.

In July, 1877, the railroad riots, caused by discontented laborers, necessitated the calling out of militia and United States troops, and in May, 1886, occurred the celebrated 'Haymarket riots' (q.v.), consequent upon the labor troubles of 1885-86. On May 4, while the police were attempting to break up an Anarchist meeting, a bomb was thrown among them, and 27 of their number were wounded, of whom seven subsequently died. In 1893 the great World's Fair (see World's Columbian Exposition) was held here. In 1894 a large number of laborers went on a strike, destroying property valued at $1,000,000, and again making it necessary to call out the militia and a detachment of United States troops.

Bibliography. Mason (editor), *Early Chicago and Illinois* (Chicago, 1890); Kirkland, *The Story of Chicago* (Chicago, 1892); and Moses and Kirkland. *History of Chicago* (Chicago, 1895); the various papers in *Fergus's Historical Series*, Nos. 1-22 (Chicago, 1876-82); Hurlburt, *Chicago Antiquities* (Chicago, 1881), and a chapter by Lyman J. Gage, in Powell, *Historic Towns of the Western States* (New York, 1901); Andreas, *History of Chicago* (Chicago, 1884).

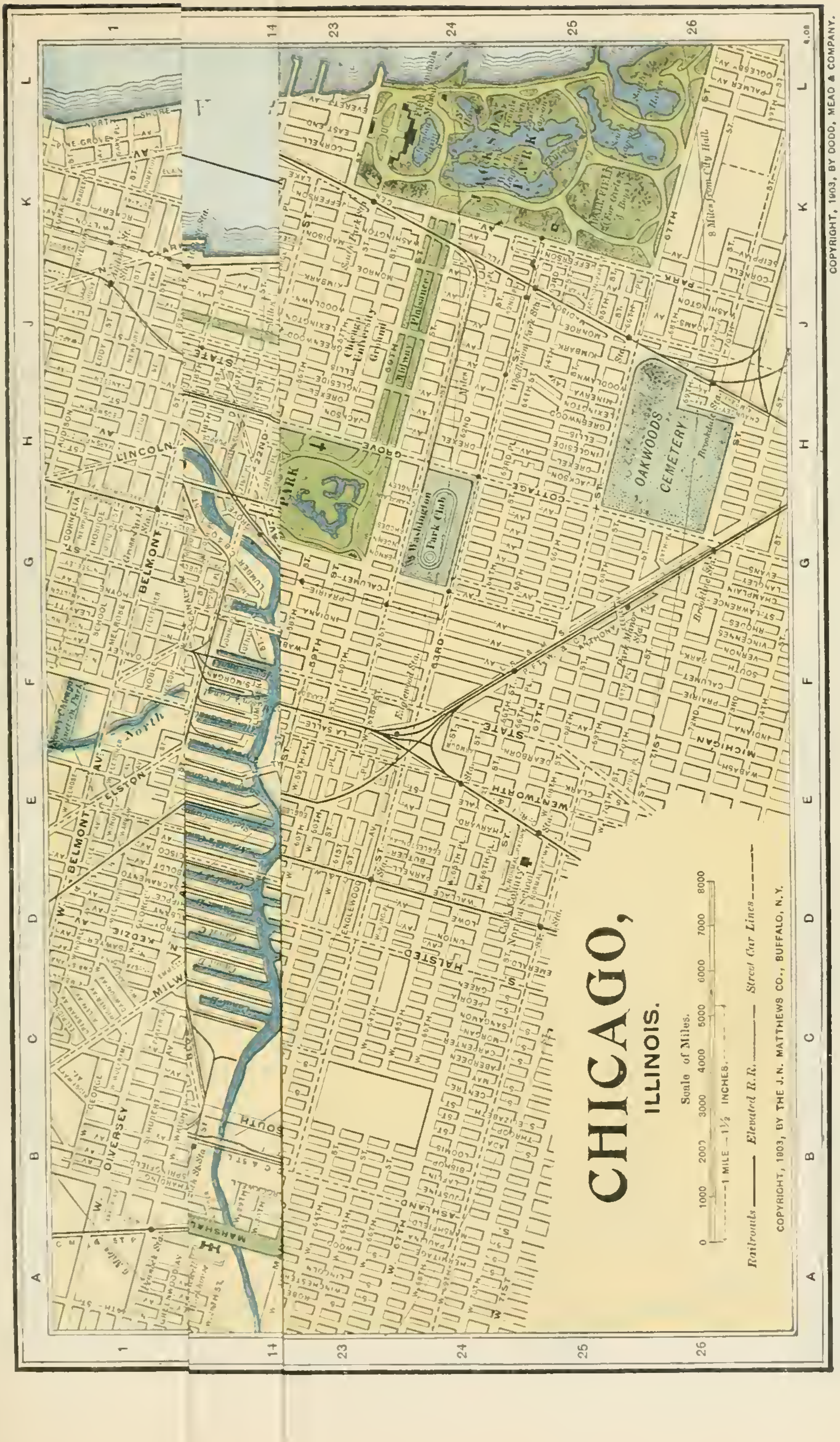
CHICAGO DRAINAGE CANAL. This canal was built to connect the west branch of the south fork of the Chicago River (q.v.) with the Des Plaines River, one of the head streams of the Illinois River, under such conditions that the water flows from Lake Michigan, through the Chicago River and the canal, into the Des Plaines River, thus reversing the direction of flow of the Chicago River. The object of the canal is to divert to the Illinois River the sewage of Chicago, which had been previously discharged into Lake Michigan. The engineering difficulties were peculiar, and aroused much professional and general interest. Work was begun on the canal on September 3, 1892, and it was formally opened on January 28, 1900. The canal proper begins on the west fork of the south branch of the Chicago River, at Robey Street, 5.8 miles from the lake, up to which point the Chicago River had to be dredged, and extends to Lockport, a distance of 28.05 miles, where the water action is controlled. Here there is a basin of sufficient width to allow vessels to turn. The tail-race below Lockport, which carries the water to the Des Plaines River, is 6500 feet long. The flow of water through this race is controlled by sluice-gates and a dam. It was necessary, however, to carry the construction to Joliet, 7.1 miles farther, so that the total distance from the lake to Joliet is about 40 miles. The width of the canal is 160 feet at the bottom and 162 feet at the top, through rock, and 110 to 202 feet at the bottom and 200 to 300 at the top, through earthy soil, the actual width in most of the distance being but 100 feet, this being sufficient for the flow of water at the rate of 300,000 cubic feet per minute. The depth is 36 feet, with a minimum depth of water of 22 feet. The cost of the canal up to the time of 'opening' was about $33,000,000. The construction has been most of the time under the charge of Chief Engineer Isham Randolph. Current numbers of the *Engineering News* contain much information in regard to the canal. See SEWAGE DISPOSAL.

CHICAGO ORCHESTRA. A permanent orchestra, under the direction and leadership of Theodore Thomas (q.v.), and established at Chicago, Ill. It was organized in 1891, and is supported partly by subscription and partly by the sale of seats for the Friday afternoon public rehearsal and the Saturday evening concert, which are given weekly during the season. The rates of admission are designedly moderate, the deficit at the close of the season being periodically met by the guarantors of the association, a number of public-spirited citizens, through whose generosity alone the establishment of a permanent orchestra has been made possible. The organization formerly consisted of about sixty players, but in 1901 the number was increased to ninety. In 1898 the orchestra was reinforced by a chorus of mixed voices under the direction of Arthur Mees, but it was found advisable to abandon the idea at the close of the season. The history of the organization has not been entirely peaceful. A strict adherence to the highest classic ideals, and an unswerving refusal to be influenced by local criticism or financial exigencies, at first caused considerable friction, but the annually decreasing deficit and the greatly increased attendance have amply justified the course of the conductor, who has brought his organization to a plane of excellence where it compares favorably with the world's greatest orchestras.

CHICAGO RIVER. A navigable stream in the city of Chicago, which formerly emptied into Lake Michigan, but the direction of whose current has been reversed by the construction of the Chicago Drainage Canal. It is formed by two branches, the North Fork and the South Fork, and it is less than a mile from this junction to Lake Michigan (Map: Chicago, J 9). Nearly 4 miles from the main river, the south branch separates into a west fork and a south fork. The United States Government and the city of Chicago have expended large amounts of money in keeping the river open to navigation. The Illinois and Michigan Canal connects the Chicago River at Bridgeport with the Illinois River at La Salle, a distance of nearly 100 miles, and during 1893-1900 the Chicago Drainage Canal (q.v.) was constructed, connecting the west fork of the south branch and Joliet, on the Des Plaines River, the distance being 28.05 miles. See CHICAGO.

CHICAGO UNIVERSITY (officially styled THE UNIVERSITY OF CHICAGO). A leading American university, situated in Chicago, Ill. The university was established at the instance of prominent Baptists throughout the country, and through gifts made chiefly by Mr. John D. Rockefeller, to replace the former University of Chicago, a Baptist institution opened in 1857, but which had been obliged, through lack of funds, to close its doors in 1886. In recognition of the funds given by Baptists to start the new university, it was provided in the charter that while no religious tests should ever be exacted from the university professors or students, yet at all times two-thirds of the trustees, and also the president of the university, should be members of regular Baptist churches.

As provided in its plan of organization, the university includes five divisions: First, schools, colleges, and academies; second, the university affiliations; third, university extension; fourth, the university libraries, laboratories, and museums; fifth, the university press. The first division includes the graduate schools, of which the divinity school, the graduate school of arts and literature, and the Ogden graduate school of science and the law school have already been organized, while schools of medicine, technology, fine arts, and music are yet to be established. Of the schools established, the Ogden School of Science was founded under the will of William B. Ogden, his executors allotting to Chicago 70 per cent. of the moneys he devised to charities. The divinity school was established under an agreement of the university made in 1891 with the Baptist Theological Union of Chicago, by which its seminary became the divinity school of the university. The colleges of the university are either integral parts of it or are affiliated. The former include the colleges of art, literature, science, commerce, and administration, and the university (teachers') college. The academies of the university are either an organic part of



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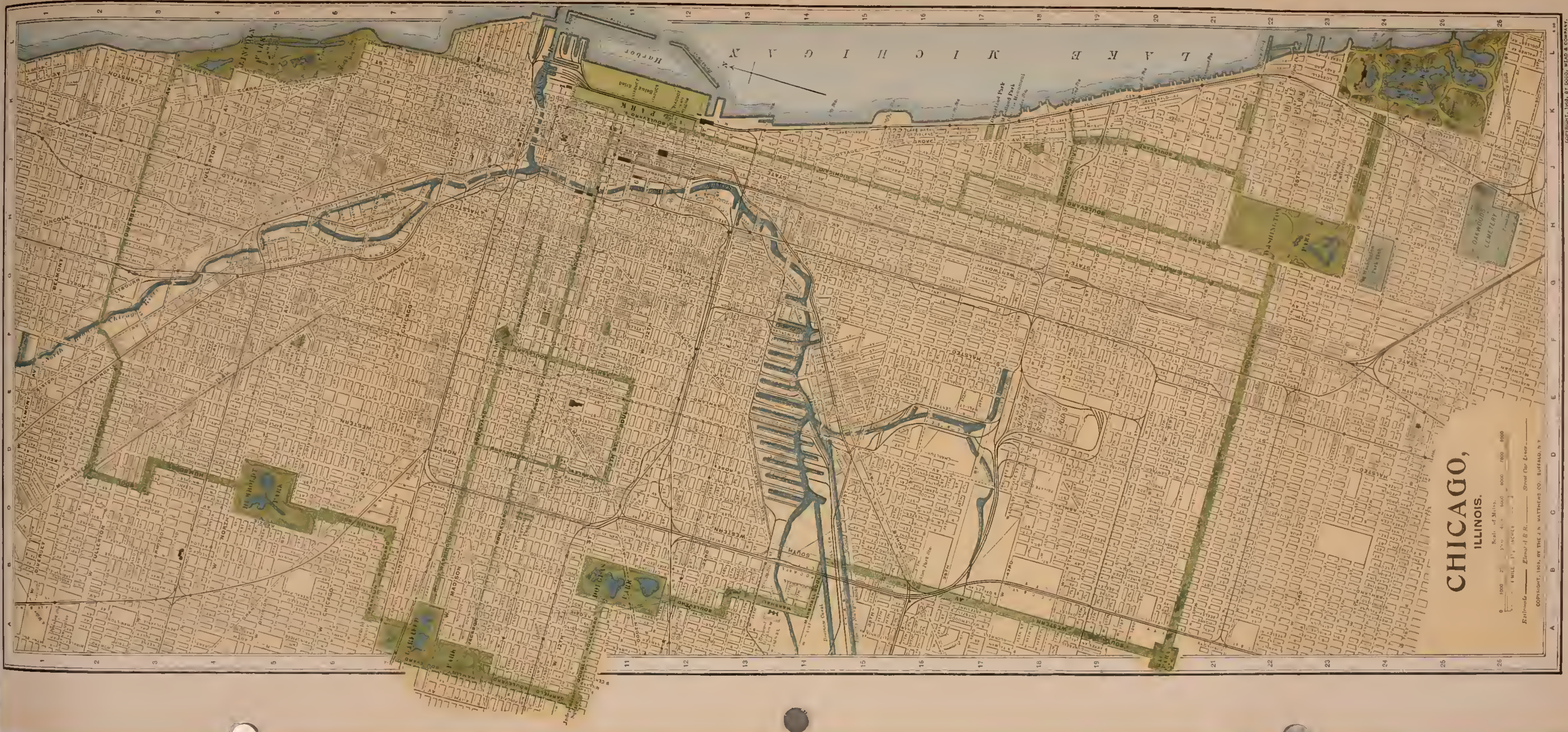

CHICAGO,
ILLINOIS.

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it, as in the case of the University Academy at Morgan Park, or are affiliated with it. The purpose of the university affiliations is to raise the standard of primary, secondary, and collegiate training, and to secure the maximum of economy in the interaction of the different factors of education. To accomplish this, the university maintains an intimate relationship with certain preparatory schools and colleges. In general this affiliation gives the university a varying amount of control over the educational activity of the college or school, and the university on its part grants official recognition, by means of degrees or certificates, to all work done under this indirect form of supervision. In 1902 the affiliated colleges were: Des Moines College, Iowa; Kalamazoo College, Michigan; John B. Stetson University, Florida; Butler College, Indiana; and the Rush Medical College, Chicago. At the same time the affiliated academies included: Morgan Park Academy (the University Academy), at Morgan Park, Ill.; Frances Shimer Academy, Mount Carroll, Ill.; Bradley Polytechnic Institute, Peoria, Ill.; South Side Academy, Chicago; Harvard School, Chicago; Kenwood Institute, Chicago; Wayland Academy, Beaver Dam, Wis.; Rugby School, Kenilworth, Ill.; Chicago Manual Training School; Culver Military Academy, Culver, Ind.; Elgin Academy, Elgin, Ill.; Dearborn Seminary, Chicago; and the University School for Girls, Chicago. In the department of university extension the attempt is made to bring the university to those who cannot come to it. Lecture and study courses are given outside of Chicago, and work done in them is recognized and credited by the university. More important are the correspondence courses, which are definitely arranged in majors and minors, according to the regular university schedule, and on which credits are allowed toward the university degrees. The university libraries number at present about 304,000 volumes. The main collection, purchased in Berlin, contains 175,000 volumes. Other collections include: The Theological Seminary Library, 40,000 volumes; library of the former University of Chicago, 10,000; Edward Olsen Library, 5000; departmental libraries, 74,000. The laboratories and museums include: The Kent Chemical Laboratory, Ryerson Physical Laboratory, the Yerkes Astronomical Observatory, the Walker Museum, Haskel Oriental Museum (including biblical, comparative religion, Syrian, and Egyptian collections), and the Hull biological laboratories (including the zoölogical, physiological, anatomical, and botanical laboratories). The university press publishes both separate books and pamphlets and departmental journals. The departmental journals are as follows: The *Journal of Political Economy;* the *American Journal of Sociology; American Journal of Semitic Language and Literature; Biblical World; The Astrophysical Journal; Journal of Geology; School Review; Botanical Gazette; American Journal of Theology; The Elementary Teacher and Course of Study; The Manual Training Magazine;* and *The University Record.* Under the head of separate publications, the university press issues many important pamphlets and books, usually written by professors or post-graduate students in the course of specialized university work.

The arrangement of courses at the University of Chicago is unique among American universities. The academic year consists of four terms; and these four terms, equally divided, complete the calendar as well as the scholastic year. Instruction is arranged with a single term of twelve weeks as the unit, instead of taking for the unit the scholastic year. Students are permitted to drop or take up university work at the beginning of any term, and a degree is given whenever the requisite amount of courses, computed by units, has been completed. The courses are arranged by majors and minors, according to the group system, and the student is required to take courses in definite groups. This system has the advantage of eradicating such artificial barriers to obtaining an education as are likely to follow from continuous courses of nine months each and from arbitrarily required studies. The degrees conferred by the university are: A.B., Ph.B., B.S., A. M., Ph.M., M.S., Ph.D., Th.B., B.D., D.D., LL.D. These degrees are given upon completion of work in the senior colleges of the university. Chicago, however, has also junior colleges, and graduation from these entitle the students to the degree or title of Associate in the arts, philosophy, or science. The work of the junior colleges is roughly equivalent to the work ordinarily done in the best American colleges in the freshman and sophomore years. A degree is given on the completion of this work, mainly to give recognition to such students as are for any reason unable to complete the course.

The University of Chicago has grown with extraordinary rapidity since it was first opened to students in 1892. This growth has been made possible by many large gifts. Of the benefactors of the college should be especially mentioned: Mr. John D. Rockefeller, whose gifts have amounted to over $9,000,000; Mr. Marshall Field, who gave the original site for the university; Mr. S. A. Kent, Mr. Silas B. Cobb, Mr. Martin A. Ryerson, Mr. Charles T. Yerkes, Miss Helen Culver, and Mrs. Anne Hitchcock. The present buildings of the university, which have been erected almost entirely from private donations, include Cobb Lecture Hall, Kent Chemical Laboratory, Walker Museum, Ryerson Physical Laboratory, Haskell Oriental Museum, a group of graduate and divinity dormitories, Snell Hall, Beecher, Kelly, and Nancy Foster halls for women, gymnasiums, four biological laboratories (comprising the Charles J. Hull group, 1896-97; Yerkes Observatory, Geneva, 1897; and Green Hall, for women, 1898). Provision also has been made for the erection of some ten further buildings in the near future. As shown by the president's report, the general assets of the university on June 30, 1902, amounted to $15,064,000, of which $8,600,000 represented investments, and the remainder buildings, grounds, and equipments. The current expenditures for the year previous had amounted to $1,048,737, and for the following year they were estimated at $1,063,000. Gifts to meet the excess of current liabilities over fixed income have been made since the foundation of the university, mainly by Mr. John D. Rockefeller. In the autumn quarter of 1901 the total number of students entered was 2646, not deducting repetitions; while deducting repetitions the number was 2431. These students were distributed as follows: Divinity school, 192; graduate school, 435; the colleges, 1641; medical school, 271; school of education, 107. In 1892 the attendance at the university was 594, thus showing nearly a fivefold increase within ten years.

The president of the university, holding office since its foundation in 1891, is William Rainey Harper, Ph.D., D.D., LL.D., formerly professor of Semitic and biblical literature in Yale University. The administrative and scholastic methods of the university have been largely molded by Dr. Harper, and a large measure of the university's immediate success is ascribed to his influence.

CHICANEAU, shē'kȧ'nō'. The judge in Racine's farce *Les Plaideurs*, whose *idée fixe* is to hold trials, and who finally turns his own home into a court of inquisition, where his servants and pet animals plead and are convicted.

CHICHÉN-ITZÁ, chē-chân'ē-tsä' (Maya *Itzá*, well-mouths). The most important of the ancient ruined cities of Yucatan, Mexico, situated 18 miles southwest of the town of Valladolid, in the northern part of the peninsula. It derives its compound name from its former occupants, the Itzá tribe of the great Mayan stock, and from two remarkable natural pools or wells, still existing, which undoubtedly furnished the water-supply of the ancient inhabitants, and may have determined the original selection of the site. With our present imperfect knowledge of Maya chronology, it is sufficient to state that the evidence indicates this as one of the most ancient cities of the peninsula, and that it continued to be occupied as a native stronghold long after the surrounding districts had yielded to the Spaniards.

The principal ruins, which were described in detail by Stephens in 1843 (*Incidents of Travel in Yucatan*), cover an area of about one square mile, with smaller edifices scattered about the encircling forest. The general structural type is that of the platform pyramid, ascended by means of broad stairways leading up to vaulted chambers, whose walls are covered with sculptured figures and hieroglyphic inscriptions or vividly colored paintings resembling those of the Aztec codices. The material is the white limestone of the country, cut into shapely blocks and set in ordinary mortar, the thicker walls being sometimes filled in with a composition of mortar and broken stone. Each prominent structure is known to the natives under a distinct name. One of the most interesting is that denominated the 'Tennis Court' or 'Gymnasium.' It consists of two immense parallel walls, each 274 feet long and 30 feet thick, and standing 120 feet apart. Both walls are covered with sculptures in bas-relief, and projecting from the centre of each, at the height of 20 feet from the ground, is set an immense sculptured ring of stone, representing two entwined serpents. From contemporary Spanish descriptions it is almost certain that this was a courtyard, devoted to the playing of a favorite game, in which the effort was to send the ball through the stone ring fixed in the wall. Another of the important ruins is the 'Castillo,' a pyramidal mound 200 feet square at the base, and rising 75 feet to a platform, the approach being by means of a grand staircase with two colossal serpents' heads in sculptured stone at the base. The Palace or Nunnery (*Casa de las Monjas*) is a rectangular mass more than 100 feet long, and somewhat less in width, with an L-shaped wing on the eastern side, 60 feet long. Resting on this artificial platform, which is over 30 feet high, is a rectangular structure 90 feet long, 18 feet wide, and 18 feet in height; and this, in turn, is crowned by a smaller edifice 30 feet long by 12 feet wide. The L-shaped wing is a specimen of the best Mayan architecture. Minor ruins are the Caracol or Round Tower, the Chuchanchob or Red House, and the Temples of the Tables, the Tigers, and the Cones. Consult Holmes, *Archæological Studies in Ancient Cities of Mexico* (Chicago, 1895).

CHICHESTER, chĭch'es-tẽr (AS. *Cissanceaster*, Lat. *Cissæ castrum*, camp of Cissa). A municipal borough and episcopal city in Sussex, England, 17½ miles east-northeast of Portsmouth (Map: England, F 6). It is well built and has wide streets. The ancient city walls are now utilized as a public promenade. The cathedral, erected in the Twelfth and Thirteenth centuries, is remarkable for its unique features of double aisles and detached campanile. Other notable public buildings are the guildhall, formerly the church of a Franciscan monastery; the Church of Saint Olave, one of the oldest in Chichester; and Saint Mary's Hospital, which was founded as a nunnery in the Twelfth Century. The town has a theological college, and there is an ancient grammar school founded in 1497. The chief trade is in agricultural products and live stock. There are malting, brewing, and tanning establishments, and manufactures of wooden-ware. The harbor, two miles to the southwest of the city, is a deep inlet of the English Channel, about eight square miles in area, and is connected with Chichester by a canal. Chichester was the Roman *Regnum*. It was taken and partially destroyed, in 491, by the South Saxons. It was soon afterwards rebuilt by Cissa, their King. It was for some time the capital of the Kingdom of Sussex. It was incorporated in 1213. During the Civil War it was taken in succession by Royalists and Parliamentarians. Population, in 1901, 12,200. Consult: Hills, "Chichester Cathedral," in *Archæological Journal*, Vol. XX. (London, 1864), and "The City Walls," in id., Vol. XLII. (London, 1886); Hay, *History of Chichester* (Chichester, 1804).

CHICHEVACHE, shēsh'väsh'. A creature in French fable, represented as a lean cow, which lived upon submissive wives. The name and the conception arose from the corruption of the old French *chicheface* (ugly face) to *chichevache* (lean cow). Bicorne, the complement of Chichevache, is a fat beast, nourished on submissive husbands.

CHICHIMECA, chē'chē-mä'kȧ (Aztec, perhaps from *chichiltic*, red + *mecayotl*, race). 'Dog people,' a term of contempt anciently applied by the more cultured Aztecs to the wild tribes northward of the Valley of Mexico. The name has no ethnic significance whatever.

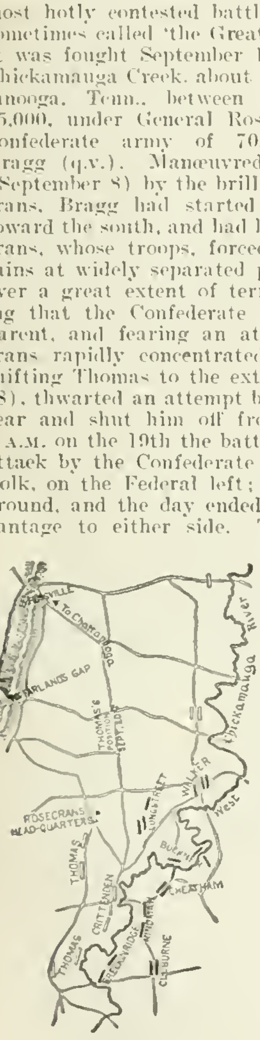
CHICK, Mrs. Louisa. The sister of Mr. Dombey, in Dickens's *Dombey and Son*. She is an anæmic copy of her brother, and he is the only person for whom she possesses the slightest semblance of affection.

CHICKADEE. See Titmouse.

CHICK'AHOM'INY. A river in Virginia, about 75 miles long, flowing into the James about 40 miles southeast of Richmond. On and near this river occurred, during the Civil War, the battles of Seven Pines or Fair Oaks, Mechanicsville, Gaines's Mill or Cold Harbor, Savage's Station, Frazier's Farm, Malvern Hill, and the second battle of Cold Harbor (qq.v.). The first of these engagements was fought on May 31 and June 1, 1862. The battle of Mechanicsville took place on June 26, 1862, and the last of the seven days' battles, that of Malvern Hill, on July 1. The second battle of Cold Harbor was fought on June 3, 1864. See SEVEN DAYS' BATTLES, THE.

CHICK'AMAU'GA. A creek in the extreme northwestern part of Georgia and in southern Tennessee. It is a tributary of the Tennessee River, into which it empties a few miles above Chattanooga. It is famous on account of the battle of Chickamauga.

CHICKAMAUGA, BATTLE OF. One of the most hotly contested battles of the Civil War, sometimes called 'the Great Battle of the West.' It was fought September 19 and 20, 1863, near Chickamauga Creek, about 12 miles east of Chattanooga, Tenn., between a Federal army of 55,000, under General Rosecrans (q.v.), and a Confederate army of 70,000, under General Bragg (q.v.). Manœuvred out of Chattanooga (September 8) by the brilliant strategy of Rosecrans, Bragg had started in apparent retreat toward the south, and had been followed by Rosecrans, whose troops, forced to cross the mountains at widely separated points, were scattered over a great extent of territory. Soon perceiving that the Confederate retreat was only apparent, and fearing an attack in detail, Rosecrans rapidly concentrated his forces, and, by shifting Thomas to the extreme left (September 18), thwarted an attempt by Bragg to attain his rear and shut him off from Chattanooga. At 9 A.M. on the 19th the battle began with a fierce attack by the Confederate right, under General Polk, on the Federal left; but Thomas held his ground, and the day ended without decisive advantage to either side. The fighting was renewed early on the 20th, and was proceeding with varying fortune, when, in pursuance of a misinterpreted order from Rosecrans, a division was withdrawn from the Federal right. This made a gap in the line of battle through which Longstreet, commanding the Confederate left, poured his troops, soon routing the Federal right and centre (under McCook and Crittenden respectively), and driving them in wild disorder back toward Chattanooga. The whole Confederate army was now massed against the Federal left; but Thomas stood firm against tremendous odds throughout the day, gallantly repulsing attack after attack, and inflicting great damage on the enemy. His remarkable courage and skillful generalship alone saved the whole Federal army from meeting with an overwhelming defeat, and earned for him the title of 'The Rock of Chickamauga.' During the night, under orders from Rosecrans, he retired to Rossville, and on the 21st withdrew behind the fortifications of Chattanooga. The Federal army lost 16,179 in killed, wounded, and missing; the Confederate, about 17,800. Though the battle was won by Bragg, Chattanooga, the prize for which it was fought, remained in the possession of Rosecrans. Consult: *Official Records*, Vol. XXX. (Washington); Cist, *The Army of the Cumberland* (New York, 1882); and Johnson and Buel (editors), *Battles and Leaders of the Civil War* (4 vols., New York, 1887).



CHICKAMAUGA.

CHICKAMAUGA NATIONAL MILITARY PARK. A park in Georgia, situated on the site of the battle of Chickamauga, a few miles southeast of Chattanooga, Tenn., near the Tennessee and Georgia line. It was established under the authority of Congress, with the coöperation of those two States. The legal boundaries embrace a compact area of 15 square miles, which cover the main scene of the battle; but there have also been secured several small neighboring tracts which are the sites of events of special military interest. It is the object, so far as possible, to preserve the conditions as they existed at the time of the battle, and in order to make clear the positions and movements of the troops engaged, monuments, historical tablets, and other guide marks have been set up at the proper points. Several lofty observation towers have been erected, which command a view of the battlefield. A large part of the park is forest land, but a considerable portion has been cleared of underbrush and small timber, in order to permit free access and unobstructed views. In addition to acquiring these lands, the Federal Government has obtained a concession of many miles of approaching roadways which have been beautified. Congress appropriated $725,000 for this work, and the States have given $400,000 additional. The park was dedicated September 19-21, 1895. It is the first time that a battlefield has been so completely marked and set aside as a monument of the event which happened within its boundary.

CHICK'AREE (imitation of its cry), or HACKEE. Old book names of the North American red squirrel. See SQUIRREL.

CHICK'ASAW. An important Muskhogean tribe formerly occupying northern Mississippi and the adjacent part of Tennessee, and now settled in the western part of the Indian Territory with an autonomous government, under the name of the 'Chickasaw Nation.' They were a restless and warlike people, and throughout the colonial period adhered to the English side as against the French, who tried repeatedly, but without success, to subdue them. From the close of the Revolution they have generally maintained friendly relations with the United States. In 1832 they sold all their remaining lands east of the Mississippi, and agreed to remove to their present location. They joined the Confederacy during the Civil War, and at its close were obliged to free their slaves and admit them to equal Chickasaw citizenship. Those of pure and mixed Chickasaw blood may number from 3000 to 5000, although the whole number of 'citizens,' including Indians, negroes, and adopted whites, is 10,500.

CHICKASAW BLUFFS, or **BAYOU**, bī'o͞o, Battle of. A battle fought, December 29, 1862, between a Federal force under General Sherman and a Confederate force under General Pemberton, strongly intrenched on the bluffs above Chickasaw Bayou, the Federals being repulsed with great loss. It was the result of an attempt by Sherman to attain the rear of Vicksburg, by way of Yazoo River, with a view to coöperating with General Grant in his operations against that city. (See Vicksburg, Campaign Against.) The Federal loss in killed, wounded, and missing was almost 2000; the Confederate less than 200. An interesting account of the engagement is given in Sherman, *Memoirs* (2 vols., New York, 1888).

CHICKEN. See Fowl.

CHICKEN-BIRD, or **CHICKEN-PLOVER.** The turnstone.

CHICKEN CHOLERA. See Fowl Cholera.

CHICKEN-FLEA. See Chigoe.

CHICKEN-LICE. See Fowl; Louse.

CHICKEN-POX, or Varicella (Neo-Lat., from *variola*, smallpox, from Lat. *varius*, spotted). An acute contagious disease, chiefly of children. It is characterized by early fever, an eruption of papules and vesicles, with mild constitutional disturbance. In most cases fever is present twenty-four hours before the eruption appears. The eruption comes out in crops, on the face, scalp, or shoulders, as red, widely scattered papules, spreading slowly over the body, one crop maturing while another is appearing. Thus red papules, blebs filled with clear fluid, and crusts, are found at the same time in a small area. Pitting is rare, and generally occurs, if ever, on the face. Chicken-pox is extremely contagious, but very rarely dangerous. Complications or serious sequelæ are rare. Erysipelas, gangrene, inflammation of glands, abscesses, or kidney-disease may occur. Isolation of cases is necessary till all crusts separate and fall off. Chicken-pox bears no relation to smallpox, and is unaffected by vaccination.

CHICKEN-SNAKE. (1) A very slender harmless snake (*Coluber quadrivittatus*), about 3 feet long, yellowish-brown, with a straw-colored head, tail, and abdomen, and two brown stripes along each side of the body. It is common from South Carolina to Florida and Alabama, and often enters buildings in search of mice and young poultry; and is sometimes known as the 'four-lined snake.' (2) In the Northern States, the milk-snake (q.v.).

CHICKENSTALKER, Mrs. An aged shopkeeper in Charles Dickens's *The Chimes*.

CHICKEN TORTOISE, tôr'tis, or **CHICKEN TURTLE.** One of the edible 'painted' turtles (*Chrysemys reticulata*) of the southern United States.

CHICK'ERING, Jonas (1797-1853). A self-taught piano-maker of Boston, who eventually established the largest piano manufactory in the United States. He was greatly esteemed for his public spirit and benevolence.

CHICKLING VETCH. See Lathyrus.

CHICK-PEA (corruption of *chich-pea*, from OF. *chiche*, from Lat. *cicer*, chick + Engl. *pea*). A plant of the genus Cicer, of the natural order Leguminosæ, having pinnate leaves, solitary axillary stalked flowers, and two-seeded pods, inflated like bladders. The common chick-pea (*Cicer arietinum*) is a native of southern Europe. It is an annual, 1½ to 2 feet high, of a stiff, upright habit, covered with glandular hairs. The seeds abound in starch, and have a slightly bitterish taste. They are about the size of common peas, and resemble in appearance a ram's head; hence the specific name. The ripe seeds are eaten either boiled entire or made into pea soup. They are sometimes roasted as a substitute for coffee. A red-seeded variety is extensively grown in the East, both for table use and for stock food.

CHICKWEED. A name applied to a number of species of Stellaria. One of the most common weeds of gardens and cultivated fields is a species of stitchwort or starwort (*Stellaria media*). It is a native of most parts of Europe and of Asia, appearing during the colder months even on the plains of India, and has been abundantly introduced in America and elsewhere. It is an annual, with a weak procumbent stem and ovate leaves, very variable, but always characterized by having the stem curiously marked with one or two lines of hairs. The leaves of chickweed afford a fine instance of the 'sleep of plants,' in that they close up on the young shoots at night. Although generally regarded as a troublesome weed, chickweed is used for feeding cage-birds, which are very fond of both its leaves and seeds. It is a good substitute for spinach or greens. A number of species of a nearly allied genus, *Cerastium*, natives of Europe, also bear the name of chickweed, or mouse-ear chickweed, and the name is occasionally given to other plants, either botanically allied or of somewhat similar appearance, as to *Holosteum umbellatum*, introduced from Europe, common in parts of Pennsylvania and New Jersey, where it is called jagged chickweed.

CHICLANA-DE-LA-FRONTERA, chê-klä'nȧ dȧ lȧ frôn-tā'rȧ. A town of Andalusia, Spain, about 12 miles southeast of Cadiz (Map: Spain, D 3). It is pleasantly situated on the Lirio, and has manufactures of linen, earthenware, and brandy. Its mineral baths are much frequented by the inhabitants of Cadiz. Population, in 1900, 10,868.

CHICLAYO, chê-klä'yô. A town in the Department of Lambayeque, Peru, situated in a sugar-growing plain near the coast (Map: Peru, B 5). It is the residence of a United States consular agent. Population, 13,000.

CHICMOZTOC, chĭk'mŏs-tŏk' (Nahuatl, seven caves). The mythical birthplace of the Nahuatl race, in Aztec legend.

CHICO, chē'kô (Sp., small). A city in Butte County, Cal., 96 miles north of Sacramento, on Chico Creek and on the Southern Pacific Railroad (Map: California, C 2). It is the seat of a State normal school, and contains a public library. The city has flour-mills, lumber-mills, foundry and machine shops, etc., and carries on a considerable trade in grain, fruits, live stock, wool, and lumber. Population, in 1890, 2894; in 1900, 2640.

CHIC'OPEE. A city in Hampden County, Mass., three miles north of Springfield, on the east side of the Connecticut River, at the mouth of the Chicopee, and on the Boston and Maine Railroad (Map: Massachusetts, B 3). By means of several dams, abundant water-power is derived from the Chicopee River for the variety of manufactures for which the city is noted. The products include firearms, cotton goods, knit goods, bicycles, knitting-machines, agricultural implements, bronze statuary, swords, machine and mechanics' tools, boilers, carpets, athletic goods, and many other articles. The city maintains an almshouse and a public library of about 21,000 volumes. The government is vested in a mayor and a city council, the majority of whose members are elected at large, and in the customary administrative departments. Population, in 1890, 14,050; in 1900, 19,167.

Settled about 1675, Chicopee was incorporated as a town in 1848, including the villages of Chicopee Falls, Fairview, and Willimansett, and was chartered as a city in 1890. Consult Holland, *History of Western Massachusetts* (Springfield, 1855).

CHICOPEE RIVER. A river formed near Three Rivers, Mass., by the junction of the Quaboag, Ware, and Swift rivers (Map: Massachusetts, B 3). It flows west, and empties into the Connecticut River at Chicopee. It is 20 miles long from the mouth to Three Rivers, and with the Quaboag about 50 miles. It drains an area of 700 square miles, and has twenty-eight ponds in its basin. It has a rapid fall, thus affording extensive power at Chicopee, Chicopee Falls, Ludlow, and Three Rivers. The name Chicopee is sometimes applied to the Quaboag branch as well.

CHICORY, or **SUCCORY** (Fr. *chicorée*, Lat. *cichorium*, from Gk. *κιχόριον*, *kichorion*, chicory). A plant belonging to the genus Cichorium, of the natural order Compositæ, the same natural family of plants to which the sunflower, the oxeye daisy, the dandelion, the lettuce, and other useful and obnoxious plants belong. The few species are all herbaceous perennials, with spreading branches and milky juice, natives of Europe and western Asia. Chicory has become naturalized in the United States, occurring as a weed along roadsides, in fence rows, and in fields. Common chicory (*Cichorium intybus*) grows from one to five feet high. The leaves resemble those of the dandelion, but are generally larger, with the exception of those on the upper part of the stalk, which are small and inclined to be lance-shaped, and the flowers, of a beautiful blue, though sometimes pink or white, occur in heads from 1 to 1½ inches in diameter. The plant has a long, carrot-shaped root, whitish-yellow or grayish-yellow in color on the outside, but white within. Chicory is quite extensively cultivated in Europe for use as a table salad, for fodder, and for the roots. It is also grown to some extent for its roots in the United States. (For illustration, see SALAD PLANTS.) The young leaves, when properly blanched, are considered equal as a salad to those of endive, a plant belonging to this same genus. The young green leaves are eaten much in the same manner as spinach, and the roots, as long as they are young and tender, are also used as a food. The plant also has some merit as a forage crop. It is principally cultivated, however, for its roots, which are roasted and ground, and in that form are used as a substitute for coffee and as an adulterant for coffee, snuff, and other articles. Chicory itself, however, is sometimes adulterated.

CHICOT, chē'kô, *Fr. pron.* shē'kō'. See GYMNOCLADUS.

CHICOUTIMI, shē-kōō'tē-mē'. The capital of Chicoutimi County, Quebec, Canada, at the confluence of the Chicoutimi River with the Saguenay, and on a junction line of the Quebec and Lake Saint John Railway (Map: Quebec, E 2). It is an important lumber town, with one of the largest establishments and trades in that commodity in Canada. It is the see of a Roman Catholic bishopric, and has a cathedral, college, convents, and sailors' hospital. The settlement dates from the Jesuit chapel built in 1670, interesting relics of which were found during the erection of a new chapel in 1893. Population, in 1901, 3826.

CHIEF (OF. *chef*, chief, It. *capo*, from Lat. *caput*, head). In heraldry (q.v.), an honorable ordinary.

CHIEF JUSTICE. In the English and American judicial systems, the title of the presiding justice of a bench or court of judges—the terms judge and justice being identical in meaning. The presiding or superior judge of the King's (or Queen's) Bench and of the Court of Common Pleas in England has always borne this title, the former being known also as the Chief Justice of England, and ranking all other judicial officers of the kingdom except the Chancellor (q.v.). The corresponding officer of the Court of Exchequer, whose judges were known as barons, was called the Chief Baron. See BARON.

The presiding justice of the Supreme Court of the United States, and of the courts of highest jurisdiction in most of the several States, bears the title of Chief Justice or Chief Judge, as the case may be. The Chief Justice of the United States is the highest judicial officer of the republic. Among his functions are those of administering the oath on the occasion of the inauguration of the President and Vice-President, and of presiding over the Senate of the United States when that body is resolved into a high court for the trial of impeachments. The Chief Justice ranks next after the President of the United States in official dignity.

CHIEMSEE, ᴋēm'zā'. The largest lake of Bavaria, situated in Upper Bavaria, about 42 miles southeast of Munich, at an altitude of over 1700 feet. It covers an area of about 33 square miles, and is irregular in shape. The southern coast is generally swampy, while on the other sides the surrounding country is hilly and exceedingly picturesque (Map: Germany, E 5). The tributaries of the lake are the Achen and Prien, and its outlet is the Alz. It contains three islets, on one of which is the royal palace built by King Louis II., an edifice of fairy-like splendor.

CHIERI, kyä'rē (Lat. *Carea*, or *Caara*). A city in north Italy, in a fertile, hilly country, 11 miles southeast of Turin. The most interesting churches are San Domenico, dating from 1260, and Santa Maria della Scala, from 1405. Chieri has a gymnasium, a technical school, and a theatre, and linen, cotton, and silk factories. It was a manufacturing centre as far back as 1422. In the Eleventh Century it was an independent republic. Population, in 1881 (commune), 13,000; in 1900, 14,312.

CHIETI, kyā'tė. An archiepiscopal city in south Italy, capital of the Province of Chieti, 99 miles south of Ancona, near the Pescara, on a hill from which is a splendid view, extending to the Adriatic, eight miles away (Map: Italy, J 5). It has nine churches besides the magnificent Gothic cathedral, a gymnasium, a normal school, a technical school, a seminary, a theatre, four conservatories of music, a military hospital, and a chamber of commerce. It is an important centre of trade, markets wine, oil, grain, and silk, and manufactures silk and wool. There are a few remains of the ancient Teate Marrucinorum, which was the most important city of the Sabelli, and fell into the hands of the Romans B.C. 305, in the last Samnite War. It was held successively by the Goths and by the Lombards, and was destroyed by Pepin the Short. It was rebuilt by the Normans, who made it the capital of the Abruzzi. From it the order of the Theatines, founded in 1555 by Paul IV., was named. Population, in 1881 (commune), 22,000; in 1901, 26,000.

CHIFFCHAFF (imitation of its cry). A small European warbler (*Phylloscopus collybita*), having a twittering note suggesting the name; also called 'willow wren' in Great Britain, where it is common about gardens during summer.

CHIFFINCH, MASTER THOMAS. A drunken sycophant and pander to King Charles in Scott's *Peveril of the Peak*.

CHI-FU or **CHEEFOO**, chē'fōō'. A city in the Province of Shan-tung, China, so called by foreigners, though the Chinese name is Yen-tai, and Chi-fu proper is on the opposite side of the harbor. Chi-fu is in latitude 37° 32′ N. and longitude 121° 25′ E. Opened to foreign trade in 1862, the town has a native population of 32,876, with 400 foreigners living in a quarter clean, well kept, and well lighted. The natives are very orderly and civil. The climate is so bracing that in summer Chi-fu, with its good hotels and boarding-houses, is a much visited sanitarium, being but two days' journey from Shanghai. The winter is severe, the spring lovely and cool, the summer hot and rainy, and the autumn perfect, with warm days, cool winds, and cold nights. Summer amusements are varied, and there is a good club. Since the Chino-Japanese War, Chi-fu has become a coaling station much resorted to by the navies of foreign countries. Chi-fu was the seat of the famous convention of 1876 between Sir Thomas Wade and Li Hung Chang. The trade is largely in bean cake and beans, exported mainly to the southern ports of China. Silk, straw braid, and vermicelli are the other chief exports. The planting of grapes and the making of wine is a promising industry. Gold-mines 20 leagues away are worked by native capital. The net value of the trade for 1898 was 26,238,774 taels. The total tonnage of shipping in 1897 was 2,385,301, of which 1,327,559 was British.

CHIGI (kē'jē) **FAMILY.** An eminent Italian family. AGOSTINO CHIGI, its founder, was a celebrated banker, born at Siena about the year 1465. Established in Rome as early as 1485, Chigi grew immensely wealthy through banking and the possession of valuable alum-mines. His income was estimated at 70,000 golden ducats a year (about $700,000). He was one of the great art patrons of the day, and Peruzzi, Perugino, Sebastiano del Piombo, and, above all, Raphael, owed much to his generosity and friendship. Peruzzi built for him the famous Villa Farnese, which Raphael and Sodoma decorated with frescoes. He died in Rome in 1520. There is a good biography of him in Italian by Cugnoni, *Agostino Chigi, il magnifico* (Rome, 1881-83). Consult also Gregorovius, *Geschichte der Stadt Rom* (4th ed., 8 vols., Stuttgart, 1886-96; English translation, 7 vols., London, 1894-1900).—CHIGI, FABIO. See ALEXANDER VII., Pope, 1655-67.—CHIGI, FLAVIO, cardinal, born in 1810, was, up to the year 1848, an officer in the Papal noble guard. He then took orders, and became Bishop of Mira *in partibus*. In 1856 he represented the Papacy at the coronation of Alexander II., Czar of Russia, and from 1861 to 1873 he was the Papal nuncio in Paris. In the last-named year he was created a cardinal. Chigi was distinguished for his finesse and courtesy of bearing in all diplomatic business. He died in Rome, February 15, 1885.—His nephew, DON MARIO CHIGI, Prince of Chigi-Albani, who was born in 1832, is a marshal of the Roman Church and the present head of the family.

CHIGNECTO (shĭg-nĕk'tō) **BAY.** The northern extension of the Bay of Fundy, partly separating Nova Scotia from New Brunswick (Map: Nova Scotia, E 4). The main portion of the bay is about 30 miles long and averages 8 to 10 miles in width; but in its northern part it separates into two narrow arms, one extending northward about 12 miles, and the other about the same distance to the northeast. Numerous towns border the bay and its extensions, and it receives several tributary streams. See also FUNDY, BAY OF.

CHIGNON, shĭn'yŏn, *Fr. pron.* shē'nyôN'. See HAIR-DRESSING.

CHIGOE, chĭg'ō, **CHIGGER**, chĭg'gēr, or **JIG'GER** (of West Indian or South American origin). (1) A species of flea (*Sarcopsylla penetrans*), rather smaller than the common flea, and with less powerful limbs, found in the West Indies and South America, where it is excessively troublesome, attacking any exposed part of the human body, and effecting a lodgment between the skin and the flesh, often under the skin of the foot or the nails of the toes. At first its presence is indicated only by a slight itching or tingling; but an ulceration due to the development of a mass of eggs is likely soon to be the result, which is not only very painful, but even dangerous. Another species (*Sarcopsylla gallinacea*) attacks the eyelids of poultry.

(2) In the southern United States, the name is applied to the minute scarlet forms of various mites which attach themselves to the skin of man and other vertebrates, or even burrow into it; they seek those parts of the body particularly upon which the clothing presses tightly. Their bite is very annoying, though not fatal to man; but they may collect in such numbers under the wings of newly hatched chicks as to cause death. Salt-water bathing alleviates the burning of their bites on man, and on such animals as chicks salted lard or the drippings of salted bacon soon give relief when smeared on the infested surfaces. During the Civil War the soldiers often kept a piece of bacon with

which to rub infested parts of their bodies after the day's march.

CHIHUAHUA, chē-wä'wä (Aztec, water-course). An inland State of Mexico, bounded on the north by the United States, on the east by the Mexican State of Coahuila, on the south by Durango, and on the west by Sinaloa and Sonora. Area, 87,802 square miles. The surface is on the whole elevated, with a number of isolated peaks in the east and a well-marked mountain chain, known as the Sierra Madre, on the west. The State is well watered, and its chief river is the Rio Conchos, a tributary of the Rio Grande. The climate is somewhat dry and healthful, and the soil fertile, producing corn, wheat, several kinds of vegetables, and fruit, including grapes. Cotton is also grown successfully. The forests are found mostly in the mountainous districts of the west. Chihuahua has considerable mineral deposits, its silver-mines being among the richest in the republic. Some of them were worked by the Indians at the time of the Spanish Conquest. The State is traversed from north to south by the Mexican Central Railway. Population, in 1895, 260,008; in 1900, 327,004. A considerable portion of the population is creole or white; the rest consists of Indians partly civilized. There are some Apaches in the mountains, who still continue their forays on the settlements. The close of the Nineteenth Century, however, witnessed great changes in the status of the State. Large numbers of foreigners, chiefly Americans, have secured control of the industries, and have already raised the State to a leading place in the republic. Capital, Chihuahua.

CHIHUAHUA. The capital of the North Mexican State of the same name, on the Mexican Central Railway (Map: Mexico, F 3). It is situated at an elevation of about 4650 feet, on the Chihuahua River, in a plain surrounded by mountains, and it is regularly built, with broad, well-kept streets. It has a fine public square, in which is a monument erected to Hidalgo and his generals, the leaders of the Revolution of 1810. The parish church, completed in 1789, is the most pretentious building, and other features of interest are a college, formerly belonging to the Jesuits, and an aqueduct which dates from the close of the Seventeenth Century. The city is the centre of a rich silver-mining district, and is known also for its stock-raising and industrial interests, the cotton and woolen mills being among the most important in the republic. Fruits, particularly grapes and figs, are grown extensively in the adjacent region. A United States consulate is located here. Chihuahua was founded in 1539, and formerly was a much larger city, its population in the Eighteenth Century having reached 70,000. Population, in 1895, 18,279.

CHIKARA, chē-kä'rȧ. See CHOUSINGHA.

CHILÁN BALÁM, chē-län' bȧ-läm', BOOKS OF. The native name given to a series of Maya-Spanish documents still preserved among the Maya of Yucatan, based on more ancient native records destroyed at the time of the Spanish Conquest, and relating to the history, religion, culture, and social organization of the Maya people before the advent of the white man. The name signifies literally 'tiger-mouth,' and figuratively 'priestly interpreter.' See dissertation in Brinton's *Essays of an Americanist* (Philadelphia, 1870).

CHILBLAIN, or FROSTBITE. A dermatitis, or skin disease with inflammation, following exposure of the feet to the cold and to chafing or pressure in the shoes, or rarely of the temple, nose, chin, and cheeks. The lesion is a small oval or round patch of reddened and elevated tissue with a purplish centre. Ulceration or even sloughing may follow, in the severe cases; but in the ordinary chilblain, or *pernio*, there is only itching, burning, and stinging of the spots when warm, with a tenderness on pressure. Tincture of iodine, tincture of the chloride of iron, tincture of camphor, are all efficacious. Sweating of the feet should be avoided. Socks should be changed whenever moist, and cotton socks should be worn in winter. General tonic treatment and outdoor exercise should be taken.

CHILD, FRANCIS JAMES (1825-96). A distinguished American scholar and teacher. He was born in Boston, educated there in the public schools, and was graduated, at the head of his class, from Harvard in 1846. He immediately entered into the service of the college, becoming in 1851 Boylston professor of rhetoric and oratory, and in 1876 professor of English, which post he held until his death, September 11, 1896. His native zeal for learning and genuine love of literature, supplemented by a thorough knowledge of the best in foreign scholarship, enabled him not only to make his courses at Harvard very valuable, but also to enrich American scholarship with a series of excellent editions and studies. His contributions are an edition of *Four Old Plays* (1848); the *Poetical Works of Edmund Spenser* (1855), which remains the best edition of the poet, and which was his special contribution to the American edition of the British poets, of which he was general editor; *Observations on the Language of Chaucer* (1862); *Observations on the Language of Gower's Confessio Amantis* (1866); and his greatest work, the definitive and monumental edition of the *English and Scottish Ballads*. This was first issued in eight small volumes (Boston, 1857-58), and, after a most painstaking research and revision, appeared in ten large volumes (Boston, 1882-98). For biographical sketches of Professor Child, consult: Norton, in Vol. VI. of the *Harvard Graduates' Magazine* (Boston, 1899), and Kittredge, in the revised edition of the *English and Scottish Ballads*.

CHILD, Sir JOSIAH (1630-99). An eminent London merchant, and one of the popular English writers on commerce and political economy. He was the second son of Richard Child, a merchant of London. His principal work is entitled *Brief Observations Concerning Trade and the Interest of Money* (1668); a second edition, much enlarged, entitled *A New Discourse of Trade*, was published in 1690. In this work he explains his plans for the relief and employment of the poor, including the substitution of districts or unions for parishes, and for the compulsory transportation of paupers to the colonies. He was one of the directors, and for some time chairman, of the East India Company, and is said to have written several tracts in defense of the trade to the East Indies, which were published anonymously. In 1678 he was created a baronet. He died June 22, 1699.

CHILD, Lydia Maria Francis (1802-80). An American author, born in Medford, Mass. Inspired by an article in the *North American Review*, she wrote a novel dealing with early New England life entitled *Hobomok* (1821). Her next story, *The Rebels* (1822), dealt with Boston before the Revolution. After a short experience at school-teaching, she married, in 1828, David Lee Child, a journalist, and a little later, coming under Garrison's influence, both she and her husband found their real life work. In 1833 she published what is regarded as the first antislavery book by an American, *Appeal for That Class of Americans Called African.* She was, of course, more or less ostracized, but made converts. In 1840 she began to edit the *National Anti-Slavery Standard*, in New York. In 1844, with her husband, she settled in Wayland, Mass., and continued her work of propaganda, having meanwhile published many volumes of a miscellaneous nature, including her best performance, *Philothea* (1836), a tale of the time of Pericles. In 1853 she issued *Isaac T. Hopper: A True Life*, having learned to know that philanthropist during her stay in New York. She should also be remembered as a writer for children. Her literary work has not continued popular, being often over-ambitious, as in the case of her *Progress of Religious Ideas Through Successive Ages* (3 vols., 1855); but her personality was a fine one, and is well depicted in Higginson, *Contemporaries* (Boston, 1899). Consult her *Letters* (Boston, 1882).

CHILDBIRTH. See Obstetrics.

CHILDEBERT. See Franks.

CHILDE HAR'OLD'S PILGRIMAGE. A narrative poem, by Lord Byron (q.v.). It is in four cantos, the first two of which appeared in March, 1812, in quarto, and the last two in 1816 and 1818, severally. The publisher, Murray, gave £600 for the first two cantos, and 2000 guineas for the fourth. The piece abounds in descriptive passages, and is conceived in an eminently 'Wertheresque' spirit, detailing the impressions of a romantic youth during his *Wanderjahre*.

CHIL'DERMAS (AS. *cilda mæsse*, or *cildra mæsse*, children's mass), or Holy Innocents' Day. A day (December 28; in the East, December 29) observed by the Roman, Greek, Anglican, and other churches in remembrance of the children killed by Herod. It was considered unlucky to marry or to begin any work on this day. The learned Gregory says: "It has been a custom—and yet is elsewhere—to whip up the children upon Innocents' Day morning, that the memory of Herod's murder might stick the closer." It is also a holiday in the Church of England.

CHILDERS, chĭl'dẽrz, Hugh Culling Eardley (1827-96). An English statesman. He was born in London, graduated at Cambridge in 1850, and then went to Australia, where he was commissioner of trade and customs for Victoria until 1857. He then returned to England, and entered Parliament. He was First Lord of the Admiralty, in Gladstone's first Ministry, from 1868 to 1871, and introduced several important reforms in the Navy. In the second Gladstone Ministry he was Secretary of War from 1880 to 1882. He then became Chancellor of the Exchequer, and during his term of office effected a reduction in rates for telegrams. In the Gladstone Ministry of 1886 he was Home Secretary. He wrote in behalf of free trade and national education, and was a fellow of the Royal Society.

CHILDERS, Robert Cæsar (1838-76). An English Oriental scholar. He was educated at Wadham College, Oxford, where he was Hebrew scholar. In 1860 he was appointed a writer in the Ceylon civil service, and acted as private secretary to the Governor, Sir Charles McCarthy. The state of his health forced him to return to England in 1864, and in 1872 he became sublibrarian at the India Office, London. From 1873 until his death he was professor of Pali and Buddhist literature at University College, London. While a resident in Ceylon, Childers had acquired a thorough knowledge of the Singhalese or Ceylonese language. In 1869 he published his first contribution to Oriental literature, in the *Journal* of the Royal Asiatic Society. This was the Pali text of the *Khuddaka Patha*, with a translation into English, and notes. It was the first Pali text ever printed in England. To the preparation of a Pali dictionary, of which he felt the imperative need, Childers devoted nearly all of his time from 1869 until his death. This work was completed in 1875, in two volumes, and was awarded the Volney prize for 1876 by the Institute of France. After the completion of this great work he contributed many minor papers to the transactions of the learned societies, and had in contemplation a complete translation of the Buddhist Jataka Book. His unwearied exertions, however, told upon his enfeebled constitution, and he developed consumption, of which he died, July 25, 1876.

CHILD LABOR. Although children have always been used for employments accessory to those of their parents, it was the simpler requirements of the factory system which made the child a cheap and convenient form of labor, or the source of support for lazy or unfortunate adults. The apprentice system in England, by which the parish hired out its pauper children to the factories, subjected little children to such inhuman hours, brutal treatment, and unsanitary conditions that the Government was urged to interfere. Later, the children of the poor worked under similar conditions. The English Government has published many valuable reports, and the course of English factory legislation has been to raise gradually the age for beginning work, to lessen the working hours, and to require some education for the children. In the United States child labor has only become a serious question within the last thirty years. The census of 1880 was a revelation, showing children at work in many industries, some of which were extremely dangerous to health and morals. One of the worst forms, and the hardest to reach, is that of the sweat shops. State factory laws, which place restrictions on child labor, are not uniform throughout the States, and are often wanting in the West and South. These laws tend to include mercantile pursuits and other occupations. Many children are illegally employed. Even the most efficient factory inspector cannot circumvent the self-interest of employers, the greed and dishonesty of parents, or provide a remedy when the child is a necessary support for the family. The idea still prevails that the parents own the child. The evils to the child are disease, deformity, and ignorance, with often no industrial training, the child being employed in drudgery or some simple mechanical process. Child labor tends to depress wages and to develop in the community an ignorant, criminal, easily pauperized element, accustomed to a low standard of living. The remedies proposed are factory legislation and compulsory education laws. For full bibliography for the United States, consult: *American Journal of Sociology*, III. (Chicago, 1899) (contains page references to factory inspectors' reports); *Child Labor*, in American Economic Association publications, Vol. V. (Baltimore, 1899); two prize essays by Taylor, *The Modern Factory System* (London, 1891). See National Education, Systems of; Labor Legislation; Sweating System.

CHILD OF NATURE, The. A play by Mrs. Inchbald (q.v.). It was produced at Covent Garden, November 28, 1788, and published in London. It is taken from Madame de Genlis.

CHILD OF THE SEA. A surname given to Amadis de Gaul, the mediæval hero. It originated in the story that, while still in his cradle, he was thrown into the ocean by his mother to conceal her dishonor.

CHILD PSYCHOLOGY, sī-kŏl′ō-jĭ. The study of the mind of the child forms one department of general psychology. The existence of such a department implies that the mental processes of the child are, to a certain degree, unique, or at least that they demand a special method of investigation. It is difficult to say in a word what the method of child psychology is. The subject has been approached from so many directions, and with so many divergent motives, that it is not easy to make one's way through the vast amount of unclassified material which has been accumulating for a score of years. There is no doubt that a strong incentive to the study of the child's mind has been furnished by the great interest manifested for some decades in evolution. After Darwin, this interest centred in biology; later, it included the investigation of mental phenomena as well; and, as a result, comparative psychology has appeared. The minds of the animal, of the child, and of the adult now represent different stages in a single process, different levels of mental elaboration, corresponding more or less perfectly with stages of physical development. But the place of the child-mind in this series has only a general significance. It is the middle link in the chain. When we come to look more closely at the matter, we realize that childhood is itself a transition period, and that it includes a large number of developmental stages. This fact has led to the division of childhood into a number of periods or epochs, beginning at or before birth and continuing through youth. The division has sometimes rested upon a psychological basis, sometimes upon a physiological, an anatomical, or an anthropological basis. We may, e.g., mark off periods by changes in mental capacity—development of the senses, speech, emotional activity, power of attention, etc.—or by the functional activities of various bodily organs; or by stages of physical growth; or by the successive appearance of racial characteristics. This last mode of division rests upon an alleged similarity between racial development and individual development. It implies a specific, evolutionary interpretation of the facts, and has led to the 'recapitulation theory.' This theory posits a parallelism, physical and mental, between the epochs through which the race has passed—from primitive to civilized man, on the one hand, and the growth of the individual on the other. One phase of recapitulation has been adopted by the Herbartians in their theory of 'culture epochs.' They contend that the individual passes through the same stages of culture that the race has traversed. The theory seems to hold only when it is taken broadly. The 'young savage' in the child is strikingly apparent at times; and his passion for hunting, fishing, roving, and intolerance of restraint are strong reminders of lower grades of culture. But there are many unlike factors in the environment of the child and the savage. The race wrought its own culture; the child has its culture thrust upon it. It lives in a social and moral forcing-house, from which a primitive race is exempt, except in so far as it comes in contact with more civilized peoples. These differences, together with the physical immaturity of the child, can but cut across and modify 'recapitulation.' And yet this may be clearly traced in certain general tendencies of the child; e.g. in the use of gesture language, in word-inventions and onomatopœia, in rhythmic movements, in the character of his drawings, and in his æsthetic preferences. We should, however, find similar resemblances between the child of civilization and the child of primitive culture. The two seem to differ chiefly in the shorter period of infancy and adolescence which is allotted to the primitive child. So that we are led to a fact which is perhaps more important than the alleged recapitulation—the fact that childhood differs comparatively little between one level of culture and another, whereas the mental status of the adult varies materially.

But not only does the evolutionary study of the child-mind hint at the parallelism of individual and racial development; it intimates that the child often 'harks back' to experiences of his animal progenitors. Many of his emotions, as fear and anger, his instinctive and impulsive actions, his vegetarian propensities, habits of scratching, biting, clawing, teasing, his cruelty, many of his games and plays, have been instanced as showing atavistic tendencies. In this matter, again, the *via media* is the only safe way. Many so-called atavisms are simply analogies, some of them poor analogies, whose real explanation is to be found within the experience of the individual himself. We grant that the experience of the human young has many points in common with the experience of certain of the lower animals; but the question is whether the likeness is not usually coincidental. Take, e.g. the cruelty of the child. It is due largely to a failure to appreciate the significance of pain; while in the savage it is the natural result (where it really exists) of a hard struggle for survival.

Beside the evolutionary method, we find much work in child psychology proceeding from a general interest in childhood. This is a part of the child-study movement, which has acquired great momentum within the last few years. Child-study embraces many aspects of childhood—psychological, anatomical, physiological, hygienic, pathological, æsthetic, moral, sociological. Still another incentive to child psychology is given by pedagogy. Many practical problems which confront educators depend upon psychology for solution. The mental capacity of school-children is determined by psychological methods. The hygiene of the attention and of memory, the fatigue-effects of various disciplines, the times and seasons of mental aptitude and dullness, the child's power of association, and the most effective incentives to an awakening of interest, are all psychological questions, which necessarily influence methods of teaching and the arrangement of school curricula. Still, it is evident that psychology is directly concerned with a small number only of the problems of child-study and pedagogy; i.e. with the problems which relate immediately to the mind of the child.

Adult psychology forms the logical basis for child psychology; for in passing from the mind of the adult to that of the child, psychology proceeds from the known to the less known. One's own mental processes may be known at first hand; and although no one can know a fellow-mind except through the various avenues of expression, language is so flexible, and at the same time so stable, that adults who are trained in introspection can communicate their feelings, ideas, and emotions with little danger of misunderstanding. But it is different with the child. Even though he has acquired a language, he is so unskilled in its use that he would not be able to report many of his mental processes were he able to observe them. It follows, then, that the psychologist must approach the child's mind only after analyzing and classifying the contents of the normal adult mind. Although he is obliged to supplement his methods by others more indirect, his study has given him an outline map of every human mind, and, more than this, he has learned to estimate and to criticise his material. Introspection may, then, be replaced very largely by individual observation, reinforced (where possible) by experiment, and by statistical inquiries.

We have seen that we can know the consciousness of the child only by investigating it at different levels, i.e. at different ages. The mind of the infant is radically different from the mind of the child of eight, and this again from the mind of adolescent youth. There is some difference of opinion as to where lines of division shall be drawn. Almost every student of child psychology separates childhood into periods, according to his own system. Since the transition from one period to another is gradual, it is impossible to make sharp distinctions. Those divisions are best which mark the decisive and constant periods in mental development. Perhaps the most simple and the most practical is some such division as the following: (1) from the beginning of consciousness to the acquirement of speech; (2) from the acquirement of speech to school-entrance; (3) from school-entrance to puberty; and (4) the period of adolescence. Each period has its peculiar features and its special problems. In the first, as in fact in all the epochs, a good deal of aid is derived from physiology. At birth and for some time afterwards the nervous system is incomplete, 'unripe,' as Flechsig has put it. The higher cerebral centres, in particular, are not yet in a condition to functionate, so that consciousness must be extremely meagre. Moreover, some of the sense-organs mature after birth. The ear does not functionate for some days; there is no coördination in movements of the eyes; and even the *macula lutea* does not develop until intra-uterine life has ended. The successive beginning of nervous functions furnishes the best key to the nature of the infant's consciousness. To this is added the list of movements, gradually increasing in number and complexity, from which more may be learned of the developing consciousness. The difficulty in interpreting these movements is partly removed by reference to the structure of the adult mind, and by a free use of the law of parsimony, which allows only the simplest adequate explanation.

When the individual is able to make verbal reports of his experience, the method is somewhat changed. He may be asked, e.g. to discriminate or name colors, to judge a spatial or temporal interval, or to undergo a test of memory or fatigue or attention. His introspections are by no means comparable with the laboratory introspections of the trained psychologist. The child lacks the necessary patience, concentration, interest, and knowledge. Still, if the conditions are carefully arranged, and the investigator knows his sources of error, trustworthy results may be secured. Besides the observations which the psychologist is able to make for himself, there are the notes of parents, especially through the first and second periods, and of the teacher during the third and fourth. We have the classical studies of Preyer and Darwin, and of great teachers like Pestalozzi and Froebel, and also hundreds of more or less reliable and systematic observations by parents, teachers, and physicians, autobiographical sketches of childhood, records of early memories, statistical inquiries by the questionary method—results obtained by sending out lists of questions to a large number of observers—accounts of unusual minds, as of the blind, of deaf-mutes, and of such individuals as Laura Bridgman, 'psychological vivisections,' as they have been called.

There is, further, over and above the analysis of conscious complexes in which all children agree, an individual psychology of childhood to be worked out. Even within the same environment, children develop noteworthy differences. One, we say, has 'musical endowment,' another has 'a temper,' another evinces an aptitude for drawing, another is imaginative, another is willful, etc. Every one of these mental peculiarities is a highly complex affair, although we ordinarily describe it in a word or phrase; and it is important to know in just what 'endowment' consists, and how much is due to nurture and training. Whether the poet or the criminal or the painter 'is born, not made,' we shall know only when psychology has made a more thorough study of mental variations and their conditions among children. Here, again, the methods of individual and of type psychology, which have developed within the general field, furnish a starting-point for the investigation of children.

It is clear that so much material, gathered from so many sources, needs careful working over by psychology from a single, definite point of view. Each method must be scrutinized critically, and employed only where it is serviceable. The questionary, e.g. is essentially a gross and statistical method, which will succeed where a great body of objective facts is required; as regards, e.g. the child's means of expressing anger or fear, or his notions of his own rights. But, like loose autobiography and the casual observa tions of untrained persons, it will never replace the more subtle methods of psychology.

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CHILDREN, SOCIETIES FOR. In modern charitable work, great emphasis is laid upon work for the children, as they stand in the greatest need of protection and assistance, and can be most easily influenced for the better. The children's aid societies and foundling hospitals care for the dependent children and find homes for them, while the Humane Association and Society for the Prevention of Cruelty to Children shield them from abuse. Juvenile offenders are trained in industrial schools and reformatories. There are homes for crippled children, special hospitals for the sick, crèches for those whose mothers must work, schools for the deaf and dumb, the blind and feeble-minded. Boys' and girls' clubs are found in all cities. Home libraries bring books within easy reach. In some States boards of children's guardians become responsible for those left destitute. See DEPENDENT CHILDREN; PENOLOGY.

CHILDREN IN THE WOOD, THE. A British ballad, better known under the title of "The Babes in the Wood." According to Ritson, it "appears to have been written in 1595, being entered that year on the Stationers' Books." Bishop Percy considers the subject to have been derived from an old play by Robert Yarrington (1601), which tells of "a young child, murthered in a wood by two ruffins with the consent of his unkle." As the scene of the latter piece, however, is laid in Padua, not in Norfolk, Percy's reasons for a later date are by no means conclusive. As a matter of fact, nothing is definitely known of the authorship or date of the poem. A black-letter copy, very old, was contained in Pepys's collection, and bore the title, *The Children in the Wood, or the Norfolk Gentleman's Last Will and Testament; to the tune of Roger.*

CHILDREN OF THE MIST. In Scott's *Legend of Montrose*, a wild race of Scotch Highlanders, a branch of the MacGregors. Landseer has painted a picture with the same title.

CHILDREN'S AID SOCIETY. An association for rescuing neglected, wayward, and dependent children. The first was started in New York City in 1853, by Charles L. Brace. Its objects are to rescue neglected and dependent children, train them, and find situations and homes, chiefly in country districts. These and similar societies, under various names, are found in all cities, and have done a valuable work. See DEPENDENT CHILDREN.

CHILDREN'S CRUSADE. A disastrous expedition, undertaken in 1212, by large bands of children from France and Germany to recover the Holy Sepulchre. The movement was begun by itinerant priests, who promised the children divine assistance and miraculous intervention. It is said that 50,000 boys and girls took part in the fatal journey. The German division, after great hardship, reached Genoa, where, disappointed in the expected miracle of a dry path through the sea, they dispersed, some remaining and being absorbed in Genoese families, while the remainder with difficulty made their way home. The French army, after similar experiences, reached Marseilles, where some traders offered to convey them free of charge in seven ships to the Holy Land. Two of the vessels foundered on the voyage; two others reached Alexandria, where the traders sold all the children into slavery and none were returned.

CHILDS, GEORGE WILLIAM (1829-94). An American publisher and philanthropist. He was born in Baltimore, entered the navy in 1842, and spent fifteen months in the service. He then became a clerk in a bookstore in Philadelphia, but established an independent business in 1847, and in 1849 became a partner in the publishing house of Childs & Peterson. In 1864 he purchased the Philadelphia *Public Ledger*, one of the earliest cheap newspapers of the country, which under him attained a wide circulation and influence. His public gifts were munificent, including a memorial window in Westminster Abbey to Cowper and George Herbert; one in Saint Margaret's, Westminster, to Milton; a reredos in Saint Thomas's, Winchester, commemorating Bishops Ken and Andrews; a monument at Kensal Green to Leigh Hunt; a memorial fountain at Stratford-on-Avon; and in the United States, the presentation to the Typographical Society of Philadelphia of the printers' cemetery, 'Woodlands,' in that city; the erection of monuments over the graves of Edgar A. Poe and Richard A. Proctor; the erection of a stone cross on the site of the first Christian service on the California coast, at Point Reyes; and a subscription that made possible the erection and endowment of the Home for Union Printers at Colorado Springs. His benefactions to private persons also were large. Childless himself, he educated as many as eight hundred boys and girls. He constantly had a number of aged literary workers on his private pension list, and made many gifts and loans to struggling authors. He frequently bought up an entire edition of some book of an author whom he wished to aid. In 1885 he published *Recollections of General Grant*, and in 1890 a volume of *Personal Recollections.*

CHILD-STUDY. See CHILD PSYCHOLOGY.

CHILE, chē'lā, or **CHILI**, chē'lē (an Indian name whose origin has not been satisfactorily explained, no less than six derivations having been suggested; perhaps from the Quichua *chiri* or *chili*, cold, referring to the perpetual snow on many of the mountains). A republic in South America, occupying the western coast of the continent from the river Samu, 17° 57′ S., down to Cape Horn. By the latest arrangement of the boundary line in the southern part of the republic, all the territory south of latitude 52° S. belongs to Chile, with the exception of the eastern half of the Tierra del Fuego Territory and Staten Island, both assigned to Argentina. Chile is bounded by Peru on the north, Bolivia and Argentina on the east, and the Pacific on the south and west. Thus defined, Chile has a length of about 2700 miles, while its width varies from about 250 miles in the Province of Antofagasta to about 68 miles in its narrowest part, with an average of about 87 miles. The population was estimated at the close of 1899 at 3,110,085, including 50,000 Indians. The area and population in 1885 and 1895 are shown in the following table:

PROVINCES	Area square miles	Population (1885)	Population (1895)	Population per square mile 1895
Magallanes (Ter	75,292	2,085	5,170	......
Chiloé	3,995	73,420	77,750	19.4
Llanquihue	7,823	62,809	78,315	10.0
Valdivia	8,315	50,938	60,687	7.3
Arauco	4,248	73,658	59,237	13.9
Cautin	3,127	33,291	78,221	25.1
Malleco	2,857	59,492	98,322	34.3
Bío-Bío	4,158	101,768	88,749	21.3
Concepción	3,535	182,459	188,190	56.1
Nuble	3,556	149,871	152,935	43.0
Maule	2,931	124,145	119,791	40.8
Linares	3,589	110,652	101,858	29.2
Talca	3,678	133,472	128,961	35.0
Curicó	2,913	100,002	103,242	35.4
Colchagua	3,795	155,687	157,566	41.5
O'Higgins	2,524	87,641	85,277	33.7
Santiago	5,223	329,753	415,636	79.5
Valparaiso	1,659	203,320	220,756	134.9
Aconcagua	6,226	144,125	113,165	19.3
Coquimbo	12,873	176,344	160,898	12.4
Atacama	28,380	76,566	59,713	2.1
Antofagasta	72,204	21,213	44,085	0.6
Tarapacá	19,306	45,086	89,751	4.6
Tacna	8,688	29,523	24,160	2.8
Total	290,895	2,527,320	2,712,435	9.3

TOPOGRAPHY. The long coast rises nearly everywhere steeply from the sea. The region bordering it is called the Coast Cordillera. This is not a mountain range, but a diversified tableland rising at some points to 3300 feet, but usually much lower. It is composed of granite and mica-schists, skirted in some regions by Tertiary deposits which, in places, extend far inland. Older sedimentary rocks do not occur in the coast regions excepting a narrow strip of chalk skirting the shore. Chiloé and the smaller islands to the south have the characteristics of the Coast Cordillera and are a continuation of it.

The topography of the country behind the Coast Cordillera may be divided into four parts. The most northern, extending from the northern border down to the neighborhood of Copiapo, about 27° 25′ S., is a fairly even plain falling steeply toward the sea and rising to the Bolivian plateau from 12,000 to 14,000 feet above sea-level. Here and there are terrace escarpments, and mountains rise in some places above the plateau; but there is no continuous range, and the numerous volcanoes, one of which, the Llullailaco, is higher than Chimborazo by about 100 feet, are completely isolated from one another. There are no east-and-west cordilleras in this part of Chile, which is crossed by the railroad from the port of Antofagasta to Bolivia with no zigzags and without a single tunnel, large cutting, or great embankment.

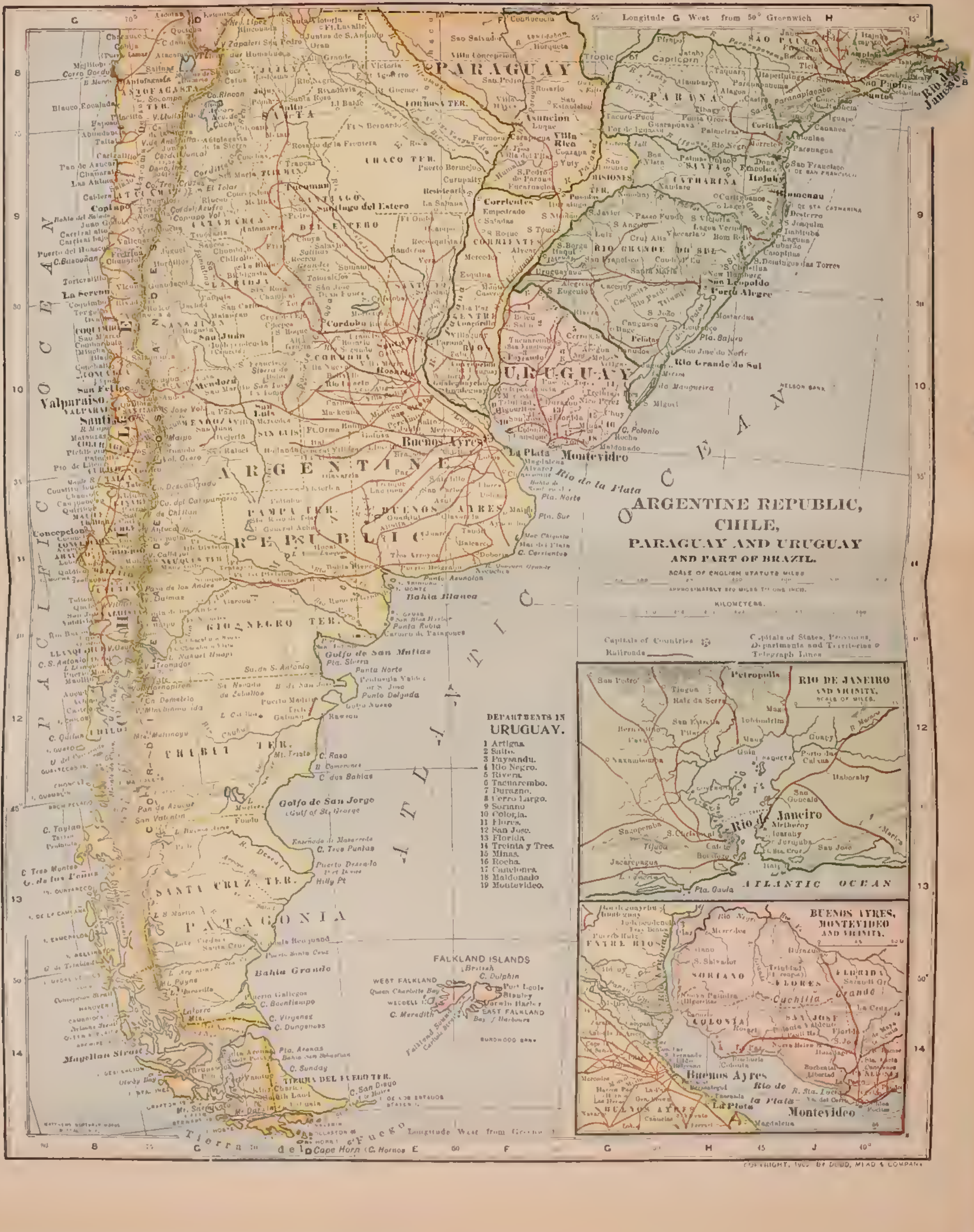
The second division, between 27° 25′ and 33° S., is marked by a number of transverse spurs running from the cordilleras which form the eastern boundary to the ocean and separating the river valleys from one another. These spurs, in traveling north or south, are crossed by passes which are often very steep.

In the third section the mountainous coast lands are separated from the cordilleras by a longitudinal valley which extends without interruption from the transverse ridge of Chacabuco, north of Santiago, to Puerto Montt, sloping from an elevation of 2300 feet in the north to sea-level at Puerto Montt; continuing under the sea, it cuts off the island of Chiloé from the mainland. This central valley, about 600 miles in length, was originally a huge cleft that was gradually filled up by detritus washed down from the Andes and the Coast Cordillera. The drift and alluvial deposits form a layer fully 330 feet thick through which no well has yet been sunk. The soil is very rich, and as the valley is traversed and irrigated by numerous rivers from the Andes, it is the great agricultural region of Chile. In the northern part of the valley is Santiago, the capital.

In the fourth section, south of Puerto Montt, the cordilleras approach the sea, and the mainland consists of nothing but the slopes of the mountains and a strip of country lying to the east between some of the highest elevations of the cordilleras and the water-parting between the two oceans. This strip has long been in dispute between Argentina and Chile. Their boundary treaty defined the boundary as the water-parting formed by the high cordilleras. When it was ascertained that the water-parting did not coincide with the line of greatest elevation, but was in large part east of it, the Chileans claimed all the country west of the water-parting, while Argentina insisted that the line of greatest elevation formed the frontier. The dispute, referred to the British Government, was in process of arbitration in 1902. The chain of the Andes is composed not only of volcanic products, but also of upheaved strata of the older Cretaceous and Jurassic formations. It continues straight to Cape Horn, forming a labyrinth of fiords, heading in glaciers, islands, and peninsulas. This configuration is similar to that of the Norwegian coast and of North America, north of latitude 50°.

The chief rivers run from the Andes straight to the sea through openings in the Coast Cordillera. Their principal tributaries, however, flow from south to north in spite of the slope southward of the central valley, a singular fact first observed by Dr. Peter Möller. The river Maule, which reaches the Pacific at about 35° S., is navigable from the central valley for light craft; farther south, the rivers Imperial, Biblio, Valdivia, and Bueno are navigated for some distance by small steamboats. Many rivers rise east of the Cordilleras and for a space run north or south until they find an opening in the range through which they reach the ocean. A striking feature of the southern part of the central valley is the existence of several large lakes at the western foot of the Andes.

Most of the coast line is remarkably uniform and it is only in the region of the fiords, mainly south of the forty-second parallel, that excellent natural harbors are found; but commerce here is small and the harbors are little utilized. Valparaiso, the principal port of the west coast of South America, stands on a bay exposed to heavy seas, and vessels are wrecked in the harbor every year. The ports to the north are merely roadsteads, the most important being seven little towns from Arica to Taltal, known as the Nitrate Ports, because nitrate of soda, the leading export of the country, is shipped from them. The best shipping facilities south of Valparaiso are at


ARGENTINE REPUBLIC,
CHILE,
PARAGUAY AND URUGUAY
AND PART OF BRAZIL.

SCALE OF ENGLISH STATUTE MILES
APPROXIMATELY 250 MILES TO ONE INCH.
KILOMETERS.
Capitals of Countries
Railroads
Capitals of States, Provinces, Departments and Territories
Telegraph Lines
RIO DE JANEIRO AND VICINITY.
SCALE OF MILES.
BUENOS AYRES, MONTEVIDEO AND VICINITY.
Longitude G West from 50° Greenwich H
Longitude West from Greenwich
FALKLAND ISLANDS (British)
PACIFIC OCEAN
ATLANTIC OCEAN

DEPARTMENTS IN
URUGUAY.
1 Artigas.
2 Salto.
3 Paysandu.
4 Rio Negro.
5 Rivera.
6 Tacuarembo.
7 Durazno.
8 Cerro Largo.
9 Soriano.
10 Colonia.
11 Flores.
12 San Jose.
13 Florida.
14 Treinta y Tres.
15 Minas.
16 Rocha.
17 Canelones.
18 Maldonado.
19 Montevideo.

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Constitución, Tome, Arauco, and Lebu (coal shipments), Valdivia, and Puerto Montt. Punta Arenas, on the Strait of Magellan, is a coaling station for all vessels passing through the Strait.

Climate. The climate of Chile must be characterized as oceanic or insular, the changes of temperature being relatively slight. The northern coast lies within the region of winds which in summer blow both toward the equator and toward the interior of the continent, and is in winter almost free from storms. The southern coast lies within the region of strong westerly winds which blow at all seasons of the year. The fact that all these winds blow the sea-air toward the land accounts for the uniform temperature. The climate of the Chilean coast much resembles that of the Californian coast. In the summer the diurnal periodicity of the wind is one of the marked climatic features; on the coast the sea-breeze blows during the day with great strength, and on the Andean heights with stormy violence. The average temperatures at low altitudes vary during the year from 65° F. at the north to 40° F. at the extreme south; during January they vary from 72° F. at the north to 50° F. at the south, and in July from 62° F. at the north to 32° F. at the south. The temperature decreases about 1° F. for each 300 feet of altitude. The average annual rainfall along the coast is less than 8 inches north of latitude 35° S., but from the latter parallel the amount increases very rapidly southward to over 80 inches in latitude 38° S.; and this excessive rainfall, reaching in some cases 130 inches, extends almost to the Strait of Magellan. The rainfall toward the interior increases slightly at the north, but decreases very rapidly in the region of great precipitation at the south. In the northern part all months lack rain; between latitudes 30° and 40° S. winter is the rainy season, with dry summers, but south of about latitude 40° S. not only is the winter rainy, but in the summertime considerable precipitation occurs.

The marked contrasts in the amount of rainfall in different parts of Chile show clearly the climatic control over the distribution of the population and their pursuits. From about latitude 28° S. to the northern boundary, the country lies in the rainless zone of the southeast trade winds and is consequently a desert, agriculture being impossible except in small irrigated districts. Mining is here the only important industry, minerals are the only exports, and nearly everything in the way of food must be brought into the northern third of Chile. South of the twenty-eighth parallel the influence of westerly or sea winds begins slightly to be felt, some rain falls, and the quantity steadily increases toward the south. In this region agriculture is profitable and is the chief occupation. The barren nitrate-fields and mining districts are replaced by green valleys and vine-clad hills. The agricultural zone extends south to about the fortieth parallel, where the rainfall becomes excessive, as the coast is exposed to the full force of the prevailing westerly winds. This is a region of extensive forests, and, when developed, its large industries will be lumbering and fisheries. South of the forty-fifth parallel the size and variety of the trees begin to diminish under the influence of the lowering temperature.

Flora. In the latitude of about 40° S. the vegetation of Chile reaches its maximum growth. In this climate of no extreme cold, the flora is always green and of mixed variety; in luxuriance the plant-growth is almost tropical. The plains have the peumo-tree, and a species of palm which is becoming rare. Forests of beech and cypress also occur. North of this middle region the rainfall diminishes, and the vegetation becomes thinner; the forests are confined to the mountain slopes, and the plains remain bare. The cacti are the last plants bordering on the arid plateau region of northern Chile. South of the central region, where the temperature decreases while the rainfall increases, are forests in which are found the *Fitzroya patagonica*—wrongly called a larch—the cypress, and the beech. The most widely diffused plant introduced from Europe and other regions is the oak, which grows more rapidly in Chile than in the northern hemisphere; among other imported plants are the poplar, which lines the favorite drives in the larger towns; the willow, chestnut, eucalyptus, and apple trees, and a number of economic plants, as wheat and the vine.

Fauna. Chile is poor in animal life. The chief mammals are the puma and other wild cats, fox, polecat, otter, the guanaco (which frequents the southern sections in large herds), the huemul, the pudu deer, the chinchilla, and the coypu. Among the marine mammals are the whale, dolphin, and seal. Birds include condors, buzzards, hawks, owls, cranes, parrots, humming-birds, and, in the southern archipelagoes, many varieties of water-fowl. Among the reptiles of the northern part are found several kinds of lizards, and farther south toads and frogs. Turtles are absent. Snakes are not numerous or venomous. Few fishes exist in the Chilean fresh waters, but the coastal marine waters are prolific of both animal life and algæ. Beetles abound. Land mammals are scarce in the archipelago regions.

Agriculture. The agricultural activities of Chile are almost wholly confined to the great central valley. This is the region of large estates equipped with modern machinery and owned by the wealthy classes, who are so potent in the political life of the republic. Furthermore, a large part of the best agricultural land is held by the Roman Catholic Church, whose political and material power is relatively greater in Chile than in any other of the Spanish-American States. It is estimated that about 50 per cent. of the population is engaged in agricultural pursuits. A large proportion of the natives are engaged as farm laborers on the extensive estates. The high price of lands prevailing in the central valley (based more on the mineral deposits they are supposed to contain than on their fertility) makes purchase difficult for the lower classes. The unoccupied land in the less favorable part of the country usually requires a considerable outlay of labor and capital before it yields crops; even then its fertility is not always sufficient to repay the farmer. Another obstacle to the development of the farming resources of the country is the 'nitrate boom.' Owing to the rapid development of nitrate-mining and the scarcity of labor in Chile, wages increased in a considerable degree, and many families from the agricultural districts of the south were induced to move to the mining districts of the north, thereby greatly raising the price of agricultural labor. The most important crops are wheat, maize, and barley. Apples and pears are the leading fruits. Most of the breadstuffs of California were formerly supplied by Chile, which also exported great quantities of cereals to Europe; but owing to the development of grain-raising in the Pacific Coast region of the United States and the increasing competition of Argentina, grain exports have largely declined. The average crop of cereals is about 15,000,000 hectoliters, of which two-thirds is usually wheat. Next to cereals, the vine is the most important agricultural industry, about 250,000 acres, for the most part in the provinces of Concepción and Colchagua, being given to grape-raising. About 1,000,000 hectoliters of wine are annually produced. It is the preferred beverage in the provinces, where the industry is important, and considerable quantities are exported to other Latin-American States. Many other farm crops and fruits of the temperate zones thrive in the central valley. Industrial plants such as flax, hemp, and tobacco are as yet cultivated only with a view to supplying the local needs. The climate is very favorable for domestic animals. The horse of Chile is valued as highly as that of Argentina. Cattle-raising has made rapid progress since a heavy tax was placed upon imports from Argentina in 1896. Ox-teams are everywhere employed on the farms; the cows are inferior as milkers. Sheep thrive in the central valley and their number is steadily increasing. Goats are very numerous in the mountainous regions.

MINING. Chile is one of the chief mineral-producing countries of South America. Prior to the Peruvian War the mineral for which Chile was mainly known was copper, which still occupies an important place in the mining output of the country. With the acquisition of the Province of Tacna from Peru, the inexhaustible nitrate deposits of that region attracted the attention of foreign investors, and since then the output of that mineral has reached such enormous proportions that Chile is found to be the chief source of the world's entire supply. The development of this industry may be best seen from the fact that the product, which amounted in 1884 to 550,000 tons, increased to 1,000,000 tons in 1890 and 1,475,000 tons in 1900, the product of that year being valued at about $40,000,000. The nitrate deposits are worked mainly by European, and especially English, capital, and the output is almost entirely exported to Europe and the United States, where it is used for fertilizing purposes. The copper-mines are situated chiefly in the provinces of Coquimbo and Atacama, and the annual yield amounts at present to about 25,000 tons, or 5 per cent. of the world's production, Chile ranking only after the United States and Spain in the quantity mined. Gold and silver ores are also found in paying quantities, and the annual output of these two metals amounts to more than $4,000,000. While most of the mining industries are in the north, a large field of coal, somewhat inferior in quality, is being developed in the south; coal is carried to the sea by the Arauco Railroad, and some is exported to the more northern republics. Borax, lead, tin, borate of lime, and a few other minerals are also mined. The annual value of all the mineral exports from Chile in the closing years of the Nineteenth Century was from $50,000,000 to $60,000,000, United States money.

MANUFACTURES AND COMMERCE. The manufacturing industries of Chile are as yet unimportant. The natives, like most Spanish Americans, do not take readily to manufacturing, while the foreign element is still too small to exercise a perceptible influence on the industrial life of the country. In the southern part of Chile, and especially in the German settlement of Valdivia, there are a number of large breweries, distilleries, tanneries, and sawmills. Soap, furniture, and shoes are also manufactured. The scarcity of labor and inadequate communication facilities will probably prevent the industrial development of the country for some time, foreign capital confining itself chiefly to the more remunerative exploitation of the mineral products of the country. The rapid development of the mineral resources of Chile has been attended by a corresponding increase in its export trade. In 1855 Chile exported to the value of about $19,000,000. In 1894 the exports showed an increase to $25,000,000, while in 1900 they amounted to $61,200,000. The mineral products constitute over 90 per cent. of the total value of the exports, and agricultural products about 9 per cent. The import trade in 1855 amounted to about $17,000,000; in 1894 it exceeded $18,000,000; while in 1900 it was valued at $46,900,000. The imports are made up chiefly of manufactured articles, and include necessaries of life, articles of luxury, also machinery and other metal products. Over 50 per cent. of the trade is with Great Britain. Germany figures second, and the United States third. The trade of the United States with Chile amounted at the close of the century to more than $10,000,000, 70 per cent. of which represented exports from Chile, and 30 per cent. imports into that country. While the exports from Chile to the United States greatly increased during the last decade of the century, the imports from the United States remained practically stationary, as the following figures will show:

	Exports from Chile to the United States	Imports into Chile from the United States
1891	$3,403,000	$3,146,000
1892	3,487,000	3,545,000
1894	3,536,000	2,273,000
1896	4,709,000	3,432,000
1898	3,736,000	2,352,000
1900	7,112,826	3,288,000

Nitrate of soda and other chemicals made up about 95 per cent. of the value of the exports of Chile to the United States, while the chief imports from the United States were iron and steel manufactures (nearly 25 per cent.), petroleum (less than 20 per cent.), cotton textiles (16 per cent.), breadstuffs (6 per cent.), besides wooden articles, instruments, and other manufactures.

The chief ports are Valparaiso, Iquique, Talcahuano, and Antofagasta. The first serves mainly for imports, and the second handles most of the export trade. There is no State bank in Chile. There were twenty-three joint-stock banks of issue at the close of 1900. These institutions guarantee their note issue by depositing cash or accepted securities with the Government. The amount of such deposits at the above date was 6,064,291 pesos. A number of land banks issue interest-bearing scrip payable to bearer, and lend money when secured by first lien on real estate.

Transportation. In regard to transportation and communication facilities, Chile stands in the front rank among the South American countries. The first railway line in Chile was opened in 1852—the short line connecting Copiapó, the capital of Atacama, with Caldera, on the coast. The construction of railway lines by the State was begun as early as 1857, when the line between Valparaiso and Santiago was opened. It was not, however, until 1888 that the construction of State lines was begun on a large scale. In that year Congress authorized the construction of twelve lines by the State, with a total length of about 750 miles. In 1900 the total length of railways in operation was about 2880 miles, of which 1353 miles were operated by the State. The State lines are conducted in a progressive way in regard to equipment and management, while the rates are unusually low. Numerous new railway lines are projected; and a number are nearing completion, among them the line connecting Valparaiso with Buenos Ayres, Argentina, of which only a small part across the Andes remains to be constructed. (For a further account of this undertaking, see *Railways*, under ARGENTINA.) Tramway lines are operated in every city of importance. The telegraph lines owned by the State had a total length of nearly 11,882 miles in 1900. There were 2710 miles owned by private companies. The telegraph rates are also very low, and the use of the telegraph and telephone is extensive, owing to the poor condition of the country roads. The shipping of the Chilean ports exceeds that of any other country in South America. In 1899 there entered and cleared over 15,000 vessels, with a registered tonnage of over 18,000,000. There were 11,320,000 tons in 1885. About 40 per cent. of the carrying trade is done in British bottoms, and the rest in German, French, and Chilean. The Chilean merchant marine numbered, in 1900, 142 vessels (39 steamers), with a total tonnage of 71,214. The Chilean ports are connected with Europe by six steamship lines.

Finance. The financial condition of Chile is far from satisfactory. The constant wars have enormously increased the public debt, and the rapid increase in the revenue since the Peruvian War, on account of the export duties on nitrate, has brought about an extravagance in public expenditures. The budget has almost doubled during the last fifteen years, the estimated revenue and expenditure for 1901 being $41,000,000 and $43,000,000 respectively. Of the former, about 50 per cent. was derived from export duties on nitrate and the sale of nitrate properties. The chief items of expenditure are: Railway building and other profitable works, one-third of the total expenditures; justice and instruction, one-sixth; interior administration, one-seventh; war and marine, nearly one-fourth; finance, about 8 per cent. The external and internal debts (including municipal) of Chile in 1900 amounted to $85,000,000 and $25,000,000 respectively. The rate of interest on the external debt varies from 4½ to 6 per cent., and the annual service amounts to about $6,000,000. The gold standard was adopted by Chile in 1895. In 1898 paper money to the amount of about $17,000,000 was issued, and a new loan of $20,000,000 was authorized for the conversion of this paper within four years. In 1901 the Government decided to extend this period two years.

Government. The Constitution of Chile, adopted May 25, 1833, guarantees to all citizens equality before the law, the inviolability of property, immunity from restraints on domicile and migration, and freedom of instruction, association, petition, and the press. The legislative authority is vested in a National Congress, consisting of a Senate and a House of Representatives, which meet at the capital, Santiago. The members of the Lower House are elected directly by the people (one for every 30,000 inhabitants), for a term of three years, while the members of the Senate are chosen from the provinces, by the same electorate, for a period of six years, on the basis of one Senator for every three Deputies. Electors to either House must be 21 years of age, and able to read and write. Members of Congress receive no remuneration. The executive power is exercised by a President, elected for a term of five years, by delegates chosen by the people of the provinces, to the number of three delegates for every Deputy. He is assisted in the discharge of his duties by a Council of State, consisting of five members nominated by himself and six members named by Congress, and by a Cabinet of six Ministers who preside over the departments of the Interior, Foreign Affairs, Worship and Colonization, Justice and Public Instruction, War and Navy, Industry and Public Works. The supreme judicial power is lodged in a high court of justice, located at Santiago, which is composed of seven members, and exercises control over the tribunals of the nation.

A democratic republic in form, the government of Chile in reality is more like an oligarchy than a democracy. The overthrow of the Spanish authority produced no change in economic or social conditions, and political power under the new régime remained in the hands of the great landowners who had controlled affairs under the monarchy. The great majority of the population have continued to remain content under the old conditions. The Conservative Party has been dominant from the very beginning of the establishment of the Republican forms of government, when Spanish rule was thrown off, and has always wielded a great influence over the people at large. As a result of the monopoly of power by a small number of families, the civil service has suffered. Lucrative places under Government are distributed as favors to impecunious relatives, or as rewards for political services, and the country is over-burdened with public functionaries. Higher ideals of government, however, are upheld by an active Liberal opposition, which agitates its cause in Congress and in the press, and has best furthered its aims by secularizing and reorganizing public education.

The system of local government is uniform in Chile, and is characterized by the concentration of authority in the President of the republic and his agents. For administrative purposes, the country is divided into 23 provinces, which are subdivided into 74 departments, 865 subdelegations, and 3068 districts. At the head of each district is an inspector; the inspectors are responsible to the subdelegates, the subdelegates to the governors of the departments, and these to the intendentes of the provinces. The governors and intendentes are appointed and controlled by the President. The departments constitute one or more municipal districts, whose affairs are administered by a council of six aldermen and three alcaldes, presided over by the intendentes, governors, or subdelegates, who possess a veto power. No one may be a member of the council who is connected with the State either as employé or as a contractor for the performance of some public service. The authority of the municipality extends over the matters of police (in the capitals of the departments the police are under the control of the President), sanitation, primary instruction, and the regulation of agriculture, industry, and commerce. The expenses of government are met partly by direct and indirect taxation and partly by subsidies from the general Government. The council is responsible to the popular Assembly, composed of all registered electors, whose sanction is required in such important matters as the negotiation of municipal loans, the inception of important public works, or the alienation of the public domains. The popular Assembly, too, votes the annual budget and audits the municipal accounts as submitted by the alcaldes.

Justice is administered in the first instance by district judges in petty or civil disputes and misdemeanors, and by justices of subdelegation in more important civil suits and minor criminal offenses. Cases of greater consequence are tried, in the first instance, before the judges of letters, of whom there is one at least in every department. Appeals from their decisions lie to the courts of appeal, six in number, located permanently in the chief cities, and exercising jurisdiction over groups of provinces. The tribunal of last resort is the High Court at Santiago.

Education. Public instruction, though gratuitously provided by the State, is still in an unsatisfactory condition. Some advance has been made in recent years through the efforts of the progressive element among the people. A large number of teachers have been brought over from Germany, and not a little has been done toward reorganizing the educational system on the most modern principles of pedagogy and school administration. Primary instruction is provided in elementary and graded schools, controlled by district visitors and inspectors. In 1900 there were 1547 public primary schools, with 114,410 pupils and 2692 teachers. Secondary instruction is afforded by the Instituto Nacional; also by the lycées, of which there is one in every provincial capital and in the chief towns of the principal departments; in 1899 the number of students in the secondary schools was 7278. The State University at Santiago gives courses in law and political science, medicine and pharmacy, the physical and mathematical sciences, and fine arts. There are, besides, schools of agriculture and mining and other technical institutions, a pedagogical institute, normal schools, an academy of painting and sculpture, a conservatory of music and oratory, and military and naval academies. In every bishopric there is a seminary for the training of the Catholic clergy. Every year the State sends to Europe, to be educated at the national expense, such students as may have distinguished themselves in the institutions of higher learning at home. Upon their return they are required to render some service to the State for a certain period, in whatever calling they may have chosen. The number of students in private institutions of different grades was 56,599 in 1900.

Population. The population of Chile, according to the census of 1885, was 2,527,320; but these figures are regarded as too high. In 1895 the population was 2,712,145, and at the end of 1900 it was estimated at about 3,100,000, or about 10.7 per square mile, a ratio three times as great as that of Argentina, and two and one-half times as great as that of Brazil. The number of foreigners in 1895 was 72,812, as against 65,000 in 1885, and included 8296 Spaniards, 7809 Frenchmen, 7049 Germans, 7586 Italians, 6241 Englishmen and natives of ten more European countries, 13,695 Peruvians, 6654 Bolivians, and only 701 persons from the United States. About one-fourth of the native population is of pure Spanish origin, while the remainder are either mixed or of pure Indian origin.

Immigration, notwithstanding the energetic efforts of the Chilean Government, has been rather light, and attended with little success. One of the most promising colonial ventures is the German colony of Valdivia. Its success, however, has been due to the exceptional character of the colonists, as well as to the conditions under which they came. When the Chilean Government, encouraged by the example of the Valdivia colony, began to encourage colonization on a larger scale, by means of foreign agencies and free passage to the country, the immigrant population became less desirable in character, and only a small proportion became permanent settlers. Still the foreign population has played not a little part in the development of the country. Throughout Chile, nevertheless, the natural increase of population is small, owing to the utter disregard for life among the natives, and to the high rate of infant mortality, amounting to about 59 per cent. among children below the age of 7.

Religion. The Roman Catholic faith is the religion of the State, and is maintained by the general Government, which has the right of nomination to the archiepiscopate and to the three bishoprics into which the country is divided. Religious instruction is compulsory in the public schools, and the clerical institutions are allowed full freedom of education. The congregations are formed by the State, and the constitutional limitations on their rights to acquire property are disregarded. The priests possess an immense influence over the people, who look to them for guidance in politics as well as in matters of faith. Though the Constitution prohibits the public exercise of any other religion than the Catholic, the clause has been so interpreted as to afford the fullest measure of toleration to dissenting creeds. Marriage was made a civil contract by the law of 1888.

Army and Navy. Military service is obligatory on all citizens. The army, of which the maximum strength is 9000 men, ranks in importance below the navy, which, after that of Argentina, is the most powerful in South America. The national guard comprises all citizens between the ages of 20 and 40. See *Modern Armies*, under Armies; and *Modern Navies*, under Navies.

HISTORY.

The Araucanians were the most important of the Indian tribes living in what is now Chile, and the history of the country before 1800 is mainly concerned with the continuous efforts of the Spanish to subjugate this fierce and intelligent nation. The survivors of the pure native race who still maintain their virtual independence are few; in general, the mixture of Araucanian blood, with that of the Spanish conquerors has given to the Chilean race its remarkable efficiency in war. The Incas of Peru, at the period of their greatest power (1450-1533), subdued a few of the northern branches of the Araucanian race, but at the time of the Spanish conquest their dominion was not firmly established. As soon as the Incas in Peru had been overwhelmed, Almagro gathered a force for the conquest of Chile, and in 1535 started south. He spent two years and a half in the country, but, encountering little success, withdrew to Peru in 1538. In 1540 Valdivia led a second expedition into the Araucanian territory, and began the real conquest of Chile. He founded Santiago in 1541, Concepción in 1550, and Valdivia in 1553, and thus secured, after much hard fighting, a permanent hold on the country.

For two hundred and fifty years the history of Chile is the record of slow expansion, through the development of mines and farms, and of almost constant wars with the natives. These were finally forced to sign a treaty in 1773, which, in their weakened condition, they continued to respect. The Governors of Chile were appointed for the most part by the Viceroys of Peru, and the post was considered the regular stepping-stone to the viceregal office. The news of Napoleon's invasion of Spain and the abdication of Ferdinand VII. aroused great unrest in all the Spanish-American colonies, and induced a number of leading Chileans to call an assembly which forced the Governor to resign, and, September 18, 1810, organized a *junta de gobierno* to govern the land so long as the French should hold Spain. This date is considered the anniversary of Chilean independence. There followed several years of intermittent fighting with the Spanish forces in Peru, varied by struggles between rival factions among the patriots, led by the Carrera brothers and by Don Bernardo O'Higgins. In 1814 this rivalry enabled the Viceroy, Osario, to reëstablish his authority in the south, and to maintain it for two and a half years. In the winter of 1816-17 General San Martin led an army of Argentine *gauchos* across the mountains, and by the decisive victory of Chacabuco, February 12, 1817, forced the Spaniards out of Chile. A year later, on the anniversary of the battle, O'Higgins formally declared the absolute independence of Chile. The patriot army had meanwhile followed the Spaniards to Peru, and on the Maipu Plains, near Santiago, April 5, 1818, another battle was fought which virtually ended the Spanish domination, although desultory fighting continued for a few years. It was not until 1844 that Spain formally recognized the loss of her provinces.

O'Higgins ruled as dictator from 1818 to 1823, when he was induced to withdraw, and a constitution was adopted. This was revised in 1828, and again in 1833, when substantially the same document in force at present was adopted. It has, however, been amended frequently, the most important changes being made in 1874. This Constitution provides for a republican form of government, with a property qualification so high that the voters form practically an oligarchy. In 1843 the question of the Argentine boundary arose, and continued a menace to peaceful relations until 1885, when a treaty was signed which gave Chile half of Tierra del Fuego and the shores of the Strait of Magellan, providing, however, for the neutrality of this waterway. Another boundary commission was then needed to determine the exact position of the line, which was to follow the watershed of the Andes. Disputes and rumors of war have continued to distract both countries to the present day. Spain, in 1864-65, forced both Peru and Chile into war by a series of petty squabbles over diplomatic titles and procedure, and there followed a year of active naval warfare. Hostilities dragged on until 1869, when the United States Minister succeeded in putting an end to active operations. Spain, however, refused to acknowledge herself beaten until 1871, when a provisional treaty was signed at Washington, followed by a definitive peace in 1879.

The exceedingly valuable nitrate deposits in the Atacama Desert, north of Chile, were opened up by Chilean capital, and between 1866 and 1878 Chile repeatedly advanced claims to the possession of this territory. Eventually, April 5, 1879, it declared war on Bolivia and Peru. Its armies were less in numbers, but far better equipped and officered, than those of its opponents, and it had much the superior fleet. The naval operations were watched with special interest by all outside powers, as being the first between modern ironclads. On October 8, 1879, the Peruvian battle-ship *Huascar* was taken by the Chilean fleet, and on November 19 the combined Peruvian and Bolivian forces were almost annihilated at Dolores. In October, 1880, Chile was in possession of all the disputed territory, and the United States Minister succeeded in bringing about negotiations for peace. The conditions imposed by Chile were not accepted by the allies, negotiations were broken off, and the battle of Miraflores, January 15, 1881, gave the Chileans possession of Lima, Callao, and practically all of the other Peruvian cities. Desultory fighting continued until October 20, 1883, when a treaty dictated by Chile was finally signed by the Peruvians. It gave to Chile the territory in dispute, excepting the districts of Tacna and Arica, which it was to administer for ten years, a plebiscite at the end of that period to determine whether the inhabitants wished to return to Peru or continue under Chilean rule. The Government of Chile, however, has been careful to postpone such an appeal to the popular voice, and as late as 1900 the Chilean Congress rejected a convention concluded with Peru in 1898 providing for a plebiscite. In 1891 war broke out between the President, Balmaceda, and his opponents in the Congress. The Congressionalists induced the principal part of the national fleet to revolt, and seized the nitrate provinces, and, with the revenue derived from them, purchased modern arms and munitions, with which they defeated the regular army near Valparaiso, captured that city, and entered Santiago (August). Balmaceda committed suicide, and order was promptly restored with the election of Jorge Montt as his successor. During the Civil War the United States had taken sides with the established Government, and, as a result, after the capture of Valparaiso, there was much ill feeling against the United States. A number of sailors from the United States steamship *Baltimore* on shore leave were attacked by a mob and one of them was killed. Serious complications threatened for a while, but the Chilean Government eventually apologized and paid $75,000 for the benefit of the injured sailors.

For general information concerning Chile, consult: Vincent, *Round and About South America* (New York, 1900); Smith, *Temperate Chile* (London, 1900); Fitzgerald, *The Highest Andes* (London, 1899); Espinoza, *Geografía de Chile* (Santiago, 1897); Kunz, *Chile und die deutschen Kolonien* (Leipzig, 1891).

There is an excellent short history of Chile by Hancock (Chicago, 1893). Molina, *Geographical, Natural, and Civil History of Chile* (London, 1817), is popular, but unreliable. On the war with Peru, there are a great number of books, of which the best are: Markham, *The War Between Peru and Chile* (London, 1882); Barros Arana, *La guerre du Pacifique* (Paris, 1882); and the report of Lieutenant Mason, of the United States Navy, who witnessed the fighting in the character of naval expert for the United States Government. The most recent general history is that of Perez Garcia, *Historia natural, militar, civil y sagrada del reino de Chile* (Santiago, 1900). For illustration, see Coats of Arms and Maritime Flags, accompanying articles Heraldry and Flag.

CHIL′EAN GUAVA, gwä′vä. See Myrtle.

CHILE PINE. See Araucaria.

CHI-LI, chē′lē. See Pe-chi-li.

CHILLAN, chė-lyän′. The capital of the Province of Ñuble, Chile, 120 miles northeast of Concepción (Map: Chile, C 11). It is regularly built, and has a Franciscan missionary church and a normal school. To the southwest are sulphur baths and to the east is the volcano of Nevado de Chillan, 9000 feet high. Population, 35,000. Chillan was founded in 1579, and rebuilt in 1835, after its destruction by an earthquake.

CHILLICOTHE, chĭl′lĭ-kŏth′ė. A city and county-seat of Livingston County, Mo., 80 miles northeast of Kansas City; on the Wabash, the Hannibal and Saint Joseph, and the Chicago, Milwaukee and Saint Paul railroads (Map: Missouri, C 2). It has a library of 7000 volumes, the State Industrial Home for Girls, and a private normal school. The city is a commercial centre for an agricultural, lumbering, coal-mining, and stock-raising country; ships apples, eggs, poultry, wool, and hides; and manufactures staves, handles, boxes, etc. Settled in 1840, Chillicothe was incorporated in 1852. The government is administered under a revised charter of 1873, which provides for a mayor, elected biennially, and a municipal council. Population, 1890, 5717; 1900, 6905.

CHILLICOTHE. A city and county-seat of Ross County, Ohio, 50 miles south of Columbus, on the Scioto River, the Ohio and Erie Canal, and on the Baltimore and Ohio Southwestern, the Cincinnati, Hamilton and Dayton, and the Norfolk and Western railroads (Map: Ohio, E 7). It is picturesquely situated in the Scioto Valley, the centre of an agricultural region, and has railroad shops of the Baltimore and Ohio Southwestern, and manufactures of wagons, shoes, furniture, paper, flour, engines, and agricultural implements. The city has a public library and a fine court-house. It was first incorporated in 1802, and since 1851 has been governed under a general State law. The administration is vested in a mayor, chosen biennially, and a city council which elects the board of health, and confirms the executive's appointments of fire, sewer, and park commissioners. The board of education is selected by the people. Population, 1890, 11,288; 1900, 12,976.

About nine miles from Chillicothe was situated the Indian village of the same name, which in May, 1779, was unsuccessfully attacked by a band of Kentuckians under John Bowman, and in August, 1780, was burned by Colonel Clark. Chillicothe was first settled by the whites in 1796, and was the capital of Ohio from 1800 to 1810. Consult Howe, *Historical Collections of Ohio*, Vol. III. (Columbus, 1889-91).

CHIL′LIES. See Capsicum.

CHIL′LINGHAM CATTLE. See Cattle, Chillingham.

CHILLINGHAM WHITE CATTLE. A breed of long-horned cattle, prevailing white, long preserved upon the Chillingham estates in northern England, and regarded as a relic, comparatively pure in blood, of the native British ox. Consult works upon cattle, and illustrated articles in *The Field* (of London), August 16 and 23, and December 13, 1890. See Plate of Wild Cattle.

CHIL′LINGWORTH, Roger. The fiendish husband of Hester Prynne in Hawthorne's *The Scarlet Letter*, who probes, gloatingly, into the recesses of the erring minister's heart. See Dimmesdale, Arthur.

CHILLINGWORTH, William (1602-44). An eminent English theologian. He was born in Oxford in 1602, educated at Trinity College, Oxford, and elected fellow in 1628. The arguments of a Jesuit named Fisher induced him to become a Roman Catholic, and in 1630 he withdrew to Douai; but his godfather, William Laud, then Bishop of London, persuaded him to reëxamine the whole controversy between Roman Catholics and Protestants, the result of which was that in 1631 he left Douai, and in 1634 returned to the bosom of the Anglican Church. Four years later (1638), in Oxford, he published a work entitled *The Religion of Protestants a Safe Way to Salvation*. It was exceedingly keen, ingenious, and conclusive in point of argument. Chillingworth was perhaps the ablest disputant of his age; and had there not been a certain fickleness and want of solidity about his intellect, and a nervous suspicion that all human reasoning might be vitiated by undiscovered fallacies, he might have produced a really great work. *The Religion of Protestants* acquired a wide popularity. Chillingworth was offered Church preferment, which he at first refused—having certain scruples in regard to the subscription to the Thirty-nine Articles—but afterwards accepted. He became Chancellor of Salisbury, Prebendary of Brixworth, in Northamptonshire (1638), and Master of Wigton's Hospital in Leicestershire. He was a strong Royalist, and on the breaking out of the Civil War (1643) accompanied the King's forces. He died, a prisoner of war, at Chichester, January 30, 1644. The best edition of *The Religion of Protestants*, along with his other works, appeared in 3 vols. (1838). For his life, consult T. Birch (London, 1742).

CHIL'LIP, Mr. A mild bird-like little doctor in Dickens's *David Copperfield*. He attends Mrs. Copperfield in her confinement and thus aids in bringing the title character into the world.

CHILLON, *Fr. pron.* shē'yôN', *Engl. pron.* shĭl'lŏn. A castle and fortress of Switzerland. It is situated in the Canton of Vaud, at the eastern end of the lake of Geneva, on an isolated rock almost entirely surrounded by water. The castle was founded many hundred years before the fortress, which was erected by the rulers of Savoy in the middle of the Thirteenth Century, and is celebrated in connection with the Genevan patriot Bonnivard, who, from 1530 to 1536, lay a prisoner in one of its underground dungeons, a subject which Byron has treated in his *Prisoner of Chillon*. See Bonnivard. The illustration "Alpine Scenery" in the article Alps shows this castle.

CHILOÉ, chē'lō-ā'. The insular province of Chile, consisting of an archipelago off the western coast of South America. The group takes its name from its principal island (Map: Chile, C 12). It is separated from the rest of the republic by the Gulf and the Canal of Chacao, and consists of the main island and over one hundred small, mostly uninhabited, islets, with a total area of 3995 square miles. The principal island contains most of the population of the province. It is of volcanic origin and mountainous, covered largely with thick forests yielding great quantities of wood for export. In the eastern part the soil is fertile and well cultivated. The climate, although hot and moist, has none of the deadly qualities which characterize that of the mainland. Corn, wheat, barley, and hemp are produced extensively, and domestic animals are raised in large numbers. Population, 1895, 77,750. Ancud, or San Carlos Ancud, the seat of government and chief seaport, is situated on the northern coast and has a population of about 3200. The archipelago was discovered by the Spaniards as early as 1558. It was the last portion of Spanish America to throw off the mother country's yoke.

CHILOGNATHA, kī-lŏg'nȧ-thȧ (Neo-Lat. nom. pl., from Gk. *χεῖλος*, *cheilos*, lip + *γνάθος*, *gnathos*, jaw), or Diplopoda (Neo-Lat. nom. pl., from Gk. *διπλόος*, *diploos*, double + *πούς*, *pous*, foot). A division of Myriapoda containing the millipedes (q.v.).

CHILON, kī'lŏn (Lat., from Gk. Χίλων). A Lacedæmonian, son of Damagetus; one of the earliest personalities in Spartan history of whom a definite political act is recorded. He was Ephor in B.C. 560 or 556, and is said to have been the originator of that office, as well as the first person to occupy it. It is further said that he died at Pisa, of joy at the news of his son's victory in the Olympian games. He was reckoned one of the Seven Wise Men of Greece, and many of his pithy sayings have been handed down to us. Among other such, the famous guiding rules, "Know thyself" and "Nothing in excess," are ascribed to him.

CHILOPODA, kī-lŏp'ō-dȧ (Neo-Lat. nom. pl., from Gk. *χεῖλος*, *cheilos*, lip + *πούς*, *pous*, foot). A division of Myriapoda containing the centipedes (q.v.).

CHIL'PERIC. The name of two Merovingian kings. Chilperic I., King of Soissons from 561 to 584, was the husband of Fredegunda. (See Brunhilda.) He was cruel, unjust, and irreligious, but energetic and brave. Chilperic II., King of Neustria from 716 to 720, was the ablest of the later Merovingians. In 719, after submitting to Charles Martel (q.v.), he was proclaimed King of all the Franks.

CHIL'TERN HUNDREDS, Steward of the. An English Crown officer, formerly appointed to preserve peace and protect the inhabitants and neighbors of the three hundreds (nominally villages) of Stoke, Burnham, and Desborough in Buckinghamshire, from the robbers who infested the beech forests of the adjacent Chiltern Hills. This primary purpose is, however, obsolete; the office is now applied for by members of the House of Commons who wish to resign their seats, an allowable excuse for such resignation being the acceptance of a place of 'honor and profit' under the Crown. As such, the Stewardship of the Chiltern Hundreds, among other similar sinecure offices, more generally presents itself, with its salary of twenty shillings and accompanying fees. It is rarely refused by its patron, the Chancellor of the Exchequer, and as soon as obtained, is vacated in readiness for the next resigning member. The practice began about the year 1750. Its legality has been disputed, but numerous precedents have established it. One refusal is recorded in 1842. Consult: *Standard Library Cyclopedia* (London, 1848); Foster, *The Chiltern Hundreds* (London, 1897).

CHIL'TON. A city and county-seat of Calumet County, Wis., 77 miles north of Milwaukee; on the Manitowoc River and on the Chicago, Milwaukee and Saint Paul Railroad (Map: Wisconsin, E 4). It is the centre of an agricultural and dairying district largely interested in barley cultivation and the manufacture of cheese, and has grain-elevators, flour-mills, machine-shops and boiler-works, lumber-mills, brewery and malt-works, etc. Population, 1890, 1424; 1900, 1460.

CHILTON, Robert Hall (1817-79). An American soldier, born in Virginia. He graduated in 1837 at the United States Military Academy, rose to be captain of the First Dragoons in 1846, and major and paymaster in 1854. During the Mexican War he distinguished himself at the battle of Buena Vista. In 1861 he resigned from the United States Army, in the same year was appointed a lieutenant-colonel in the Adjutant-General's Department of the Army of the Confederate States, and in 1862 became a brigadier-general. For some time he was chief of staff to General R. E. Lee. In 1869-79 he was president of a manufacturing concern in Columbus, Ga.

CHIMACHIMA, chē'mȧ-chē'mȧ. A caracara of the American Isthmian region (*Ibycter chimachima*) prevailingly white when adult. See Caracara.

CHIMÆRA, kĭ-mē'rȧ (Lat., from Gk. *χίμαιρα*, *chimaira*, probably fem. of *χίμαρος*, *chimaros*, yearling goat, from *χειμών*, *cheimōn*, Lat. *hiems*, Skt. *hima*, winter, not connected, as sometimes supposed, with Heb. *khāmar*, to cook). A mythical monster, who was killed by Bellerophon (q.v.) with the aid of Pegasus. According to Homer, the chimæra was a fire-breathing monster with the head of a lion, a goat's body, and a serpent's tail. The rationalistic account of the chimæra is that it represented a volcanic mountain in Lycia whose top was the resort of lions, its middle of goats, and the marshy ground at the bottom of serpents. In the same manner, Bellerophon's victory over the chimæra is explained by saying that he first made his residence on this mountain. The chimæra alone and in conflict with Bellerophon is not uncommon in ancient art. The finest representation is the large bronze in Florence. Chimæra is used figuratively to denote any monstrous or impossible conception, the unnatural birth of the fancy. It is frequently depicted on shields, as an heraldic charge. For illustration, see Plate of Dipnoi and Chimæra.

CHIMÆRA. A representative of a family (Chimæridæ) of strange cartilaginous fishes (q.v.) constituting the Holocephali. They are shark-like, and very interesting to the ichthyologist in their structure, which shows their strong affinity to ancient types of which they are the scant survivors, but have nothing but their grotesqueness to attract popular interest, as their flesh is not good. The large eggs, fertilized internally, are surrounded by a horny case which, in some species, may be 10 inches long. There are three living genera—Chimæra, Callorhynchus, and Harriotta. Chimæra is found along the coasts of Europe and Japan, on the west coast of North America and at the Cape of Good Hope. *Chimæra monstrosa*, of the Mediterranean and Atlantic, is its largest and best-known species and may reach a length of three feet; in Europe it is called 'king of the herrings;' in America, chimæra, rat-fish, sea-cat, etc. Callorhynchus occurs in the south temperate zone, and Harriotta is confined to the deep seas. See Plate of Dipnoi and Chimæra.

Fossil Forms. The genus Chimæra is found in a fossil state in the Tertiary deposits from the Miocene upward. Many related but extinct genera are known from the Devonian upward. The chimæroids reached their maximum of evolution in the Cretaceous and Eocene, and many of the extinct species were much larger than any now living. The strong cutting teeth of Rhynchodus and Ptyctodus described from the lower Devonian of North America and Russia are the only remains of the earliest members of the group, of which no other traces have been found. In the Liassic of England specimens of Myriacanthus have been found so well preserved as to show the form of the cartilaginous snout, which resembles that of the modern genus Callorhynchus. Teeth and dorsal spines of chimæroids are common in the Mesozoic and Tertiary rocks. One genus, Ischyodus, of which a perfect skeleton was found in the lithographic limestones of the Solenhofen Jurassic, has also been found in the Cretaceous of New Zealand and the Eocene of North America, indicating that this genus enjoyed in those early days a very wide distribution. See Squaloraja.

CHIMANGO, shē-män'gō. A widespread and familiar carrion-hawk (*Ibycter chimango*) of the plains regions of South America, black, with the under parts brownish ochre in the adult. For affinities and habits, see Caracara, and the books there mentioned.

CHIMAPHILA, kī-măf'ĭ-là. See Wintergreen.

CHIMAY, shē'mā', Jeanne Marie Ignace Thérèse de Cabarrus, Princess de (1773-1835). She was the daughter of the Comte de Cabarrus, Minister of Finance in Spain; was early married to the Marquis de Fontenay, but soon divorced from him, and next married Tallien, the French revolutionist, whom she induced to engage in a plot for the overthrow of Robespierre, thus becoming the chief promoter of the Revolution of July, 1794. Her social triumphs, consequent from her beauty and her free manners, gave her husband offense, and he left her, going with Napoleon to Egypt. A divorce followed on his return, and Jeanne married, in 1805, the Comte de Caraman, who afterwards became the Prince de Chimay, with whom she lived peaceably. While ranking first among the beauties of the time, she was never admitted to Court circles.

CHIM'BORA'ZO, *So. Amer. pron.* chēm'bō-rä'sō (native name, *Chiquipoya*). A volcanic peak, one of the highest of the Andes, in Ecuador, rising 20,500 feet above the sea, but only about 11,000 feet above the level of its own tableland of Quito (Map: Ecuador, B 4). Its latitude and longitude are 1° 20' S. and 79° W. The mountain has no crater, is built up of trachytic volcanic rocks, and is evidently an extinct volcanic peak. It is capped with perpetual snow, and was long regarded as the loftiest mountain in the world. The summit was for the first time reached by Whymper in 1880. Humboldt, Boussingault, Hall, and Stübel all made ineffectual attempts to reach its top.

CHIMBOTE, chēm-bō'tā. A seaport in the Department of Ancachs, Peru, situated on the Puerto Ferrol (Map: Peru, B 5). It has an active trade, and is the terminus of the railroad from Huaraz, whose port it is.

CHIMÈNE, shē'mān'. The scrupulous and nicely introspective heroine of Corneille's *Le Cid*. She refuses Rodrigo because he slew her father to save his own father's honor, and, in spite of her passion for him, seeks in every way his death.

CHIMENTI, kē-mān'tē, Jacopo di. See Clementi, Jacopo di, da Empoli.

CHIMERE, shĭ-mēr'. See Costume, Ecclesiastical.

CHIMES (from AS. *cimbal*, *cimbala*, from Lat. *cymbalum*, from Gk. *κύμβαλον*, *kymbalon*, cymbal, from *κύμβος*, *kymbos*, Skt. *kumbhā*, jar). Music played on a set of bells in a church-tower, either by a performer or by mechanism. This ancient and interesting class of music is believed to have originated in some of the German monasteries. In the Fifteenth Century the ringing of church chimes became very general in North Germany, Holland, and Belgium; the last-mentioned country was especially famed for its bell-ringing, retaining this prestige for three succeeding centuries. Bell-ringing has always reached its greatest popularity in flat countries, where the sound of the bells can 'carry' over a great distance. In England, where it is often called 'change-ringing,' this custom has also found great favor, and may be said to be one of the national institutions. A chime of bells may number from five to twelve, and is rung by swinging, causing the clapper inside to strike the bell. With this limited scale, and the rather uncertain method of producing the tone, only very simple diatonic melodies are possible. *Carillons* are more elaborate affairs, in which the bells are stationary, and are rung by striking on the outside with a hammer. Carillons were formerly played by a performer, who struck the huge keys that connected with the hammer, and with his feet operated the pedals that communicated with the larger bells. His place is now usually taken by machinery. The number of bells in a carillon varies from ten to forty, or even more; the famous one at Ghent has 48. Chimes have been introduced into many American churches. Those of Christ Church in Philadelphia, Christ Church in Boston, and Trinity Church in New York are probably the oldest in the United States. The chimes of the old Christ Church of Philadelphia have an historic interest. The bells were sent from England as a present from Queen Anne, and during the Revolution they were taken down and sunk in the Delaware River, as it was feared the British might capture them. At the close of the war they were rehung in the old belfry. Among the celebrated chimes of Europe are those of Copenhagen, Ghent, and Amsterdam. The word *chimes* is here used in its general sense, including both carillons and the smaller set of bells. See BELL.

CHIMES, THE: A GOBLIN STORY OF SOME BELLS THAT RANG AN OLD YEAR OUT AND A NEW YEAR IN. A Christmas tale by Charles Dickens, written in Genoa in 1844 and published in London in December of the same year. It was illustrated by Doyle, Leech, Maclise, and Stanfield.

CHIMESYAN, chĭm′*e*-sy*a*n. A considerable tribe about the mouth of the Skeena River, latitude 54° N., British Columbia. They are athletic and well formed, practice tattooing and wear labrets, together with rings in the nose and ears, but do not flatten the head as do the more southern tribes. They are expert fishermen, weavers, and basket-makers, and live in large communal houses of boards, with gable roofs and verandas. They have the clan system and are organized into three distinct social orders. Slavery also exists among them, as among other tribes of the northwest coast. They have many ceremonial customs, including the potlatch (q.v.). The name is said to signify people living 'on the main river,' i.e. the Skeena. They number now about 2450 in British Columbia besides some 600 who have within recent years crossed the line into Alaska. (See METLAKAHTLA.) The Chimesyan, with the Nass tribes adjoining them on the north, constitute together a distinct linguistic stock.

CHIM′MIE FAD′DEN. A character invented by Edward W. Townsend, and introduced in sketches published in the New York *Sun*, Harper's *Weekly*, the *Century* magazine, and in book form. Chimmie is a 'buttons,' who utters quaint philosophy and humor in a picturesque dialect.

CHIMNEY (Fr. *cheminée*, ML. *caminata*, fireplace, from Lat. *caminus*, hearth, from Gk. κάμινος, *kaminos*, oven, furnace). A vertical structure of stone, brick, or metal, containing an internal passageway or flue through which the smoke and waste gases of combustion are carried off from a furnace, fireplace, stove, etc. Chimneys also perform the important function of supplying draught to the fire from which they receive the smoke and waste gases. The action of the chimney depends upon the simple principle that a column of heated air is lighter than a cooler column of equal height; when therefore a flue full of heated air communicates freely by the lower part with the cooler air around it, the greater weight of the latter pushes the warm air upward, and thus an ascending current is produced. Other conditions being equal, the draught of a chimney will vary as the square root of the height. The straighter and more perpendicular the chimney, the stronger will be the draught, because the friction of the ascending current will be less, and the cooling effect of a long and tortuous course will be saved. The maximum efficiency of a given chimney is attained when all the air that passes up it enters by the bottom of the fire. In this case, its temperature is raised to the uttermost by passing through the whole of the fire, and the fire is at the same time urged to increased combustion by the blast thus obtained. A powerful furnace may be constructed by connecting a suitable fireplace, capable of being closed all round excepting at the bottom, with a tall chimney; and the amount of draught may be regulated by increasing or diminishing the aperture through which the air is admitted to the bottom of the fireplace, or by an adjustable opening above the fireplace, which will diminish the effective draught as its size is increased, or by a combination of both of these contrivances. Often an artificial or forced draught is given to a chimney by means of a fan or blower, a steam-jet, or the exhaust of a steam-engine which is so arranged that it forces a current of air upward through the flue.

There is reason to believe that the chimney, in its present sense of a funnel from the hearth or fireplace to the roof of the house, is a modern invention. In Greek houses it is supposed that there were no chimneys, and that the smoke escaped through a hole in the roof. What the arrangement was in houses in which there was an upper story is not known; perhaps the smoke was conveyed by a short funnel through the sidewall of the house, which seems to have been the first form of chimney invented in the Middle Ages. The Roman *caminus*, again, was not a chimney, but a sort of stove; and it has been a subject of much dispute whether the Romans had any artificial mode of carrying off the smoke, or whether it was allowed to escape through the doors, windows, and openings in the roof. As the climate and the habits of the people both led to the houses of the ancients being very much more open than ours are, it is probable that the occasional fires which they had of wood or charcoal may have given them no great inconvenience. It is known, besides, that the rooms in Roman houses were frequently heated by means of hot air, which was brought in pipes from a furnace below. In England there is no evidence of the use of chimney-shafts earlier than the Twelfth Century. In Rochester Castle (c. 1130), complete fireplaces appear; but the flues go only a few feet up in the thickness of the wall, and are then turned out through the wall to the back of the fireplace, the openings being small oblong holes. The earliest chimney-shafts are circular, and of considerable height. Afterwards chimneys are found in great variety of forms. Previous to the Sixteenth Century many of them are short, and terminated by a spire or pinnacle, having apertures of various shapes.

These apertures are sometimes in the pinnacle, sometimes under it, the smoke escaping as from some modern manufacturing chimney-stacks, which are built in the form of an Egyptian obelisk. Clustered chimney-stacks do not appear until late in the Fifteenth Century, when they seem to have been introduced simultaneously with the use of brick for this purpose. Each of the earlier clustered chimneys consists of two flues which adhere to each other, and are not set separate, as afterwards was the practice. Long after they were invented, and in use for other rooms, our ancestors did not generally introduce them into their halls, which, till the end of the Fifteenth or beginning of the Sixteenth Century, continued as formerly to be heated by a fire on an open hearth in the centre of the hall, the smoke escaping through an opening in the roof known by the name of *louvre*. In many of the older halls in which chimneys exist they have evidently been inserted about this period.

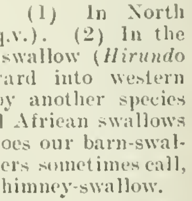
Next to their use in removing the waste gases and supplying the necessary draught for domestic and other heating apparatus, the most important use of chimneys is in connection with steam-power plants and metallurgical furnaces of manufacturing and smelting works. Chimneys for power and smelting plants are structures of considerable size and cost. They are built of masonry, usually brickwork, and of metal, usually sheet steel. One of the largest brick chimneys in the world is that of the power plant of the Metropolitan Street Railway Company in New York City, and a description of it will give a very clear idea of the character of such structures as they were built at the end of the Nineteenth Century. This chimney is 353 feet high, with an internal diameter of 22 feet; weighs 8540 tons, and required 3,400,000 bricks for its construction. In building the foundations, which cover an area of about 85 feet square, the earth was removed to a depth of 20 feet below the power-house floor, and 1300 piles were driven to a depth of about 40 feet over the entire area. These piles were cut off at a level of one foot above the top of the excavation bottom, and an immense concrete block was laid upon them 85 feet square and 20 feet thick. Smoke-flues lead from the boilers to the chimney from opposite directions, and as there are three stories in the boiler-house upon which the boilers are installed, there are six large openings to the chimney, two on each of the three floors. The chimney is built of two concentric shells, and the outer shell is stiffened by twelve interior longitudinal ribs projecting radially toward the inner shell and having a clearance of ½ inch. The inner shaft has a constant diameter of 22 feet, and the outside dimensions of the chimney range from a square base 55 feet on a side to a cylindrical neck 26 feet 10 inches in diameter, 316 feet above. The inner shell varies from 24 inches thick at the base to 8 inches thick at the top, and is lined with 8 inches of fire-brick for a height of 90 feet, and with 4 inches of fire-brick for 25 feet more; above this height the shell is not lined. The outer shell is 28 inches thick at the base and 16 inches thick at the top. The top of the chimney is protected by a cast-iron cap.

As an example of steel chimneys, that for the Ridgewood pumping station of the Brooklyn, N. Y., water-works may be selected. The height of this chimney from the ground is 217 feet, the minimum diameter is 8 feet, and the diameter at the base is 25 feet. It is lined with brick for one-half its height. There are 137 plates in the structure, varying in weight from 800 to 1400 pounds, and in thickness from ¼ inch to ½ inch. The plates are of open-hearth steel, having a tensile strength of 65,000 pounds per square inch. The chimney was erected in ten weeks, the work of erection being performed from an inside scaffolding which was raised as the work progressed. This chimney cost about $10,000. The following table gives the location, material, height, and diameter of some of the highest chimneys in the world:

LOCATION	Height ft.	Smallest diameter ft.	Material
Cleveland, Ohio..........	225	11½	Steel
Le Creusot, France......	279	7½	Wrought Iron
Sparrow's Point, Md..	225	13¾	Steel
Darwin & Mostyn Iron Co., England...........	260	11	"
Mechernich, Cologne....	440½	9 ft. 10 ins.	Brick
Fall River, Mass.........	350	11	"
Port Dundee, Glasgow.	488	13 ft. 4 ins.	"
Townsend, "	454	13 ft. 4 ins.	"
Tennant & Co., "	334½	....	"
Bolton, England.........	367½	13 ft. 2 ins.	Stone
Huddersfield, England	306	. . ..	Brick

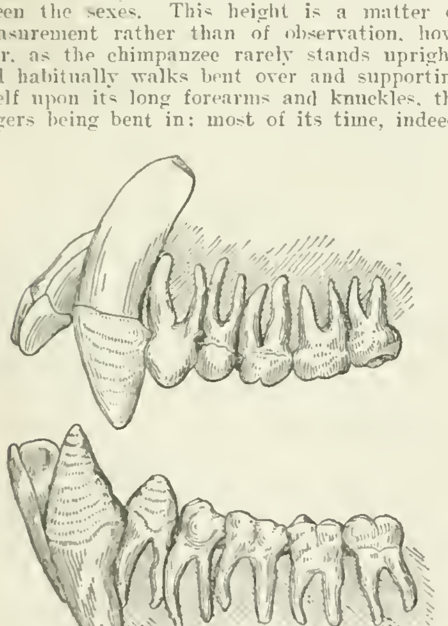
CHIMNEY-SWALLOW. (1) In North America, the chimney-swift (q.v.). (2) In the Old World, the familiar house-swallow (*Hirundo rustica*), which ranges eastward into western China, where it is replaced by another species (*Hirundo gutturalis*). Several African swallows belong to this group, as also does our barn-swallow (q.v.), which English writers sometimes call, unfortunately, the American chimney-swallow.

CHIMNEY-SWIFT. The small, sooty, swallow-like bird, commonly but mistakenly called a 'swallow,' which throngs about chimneys in all parts of North America, and represents an almost cosmopolitan family. (See SWIFT.) It is migratory, spreading northward into Labrador and the Fur Countries in early summer, and escaping in winter to Central America. Supported upon narrow wings, each an inch longer than its total length (about five inches) from beak to tail, it spends its time almost continuously in the air, rarely if ever alighting except inside the hollow tree or chimney where it lives, and ceaselessly pursuing, open-mouthed, the minute insects upon which it lives, catching all of them on the wing, and doing us an important service. It even gathers in this way the materials for its nest, grasping with its feet tiny dead twigs projecting from lofty tree-branches, snapping them off and bearing them away, without a pause in its flight. Before the civilization of the country, as yet in remote districts, it inhabited hollow trees, sometimes for hundreds of generations in succession, attaching its nest to their interior wall; but as soon as houses were built,


Chimney-Swift, showing spines at end of tail-feathers.

the old trees were abandoned for the new chimneys, the superior attractiveness of which lies in greater safety, and in better satisfying a racial tendency to inhabit caves. In some northerly districts these birds are latterly abandoning chimneys for attics and similarly sheltered, but light, situations. The nest is formed of small twigs, glued together by the bird's saliva, shaped like a half-cup, or hollowed bracket, and glued to the interior wall of the chimney. The eggs, four to six, are small and pure white; and it is some time after the nestlings are fledged before they are permitted to scramble out and try their wings. In these chimneys, or trees, the swifts sleep at night, clinging upright with their long toes to the surface, and supported upon the stiff spine-tipped feathers of the tail, firmly pressed against the wall. In accustomed and favorable places large flocks live together; and one of the most familiar and pleasing exhibitions of American bird-life is to watch the swifts at sunset circling in a twittering crowd about the chimney-top, into which, as dusk comes on, they drop, one after the other, as if each went down the vortex of a whirlpool. The scientific name of the common species of the United States is *Chætura pelagica.* See Plate of SWIFTS AND THEIR NESTS.

CHIMPAN'ZEE (Guinea). An anthropoid ape (*Anthropopithecus niger*) of equatorial Africa, which has been known to Europeans for 500 years. The chimpanzee, though taller than an orang-utan (q.v.), falls short of the stature of the gorilla, and never exhibits the breadth and massiveness of frame shown by an old male of that species; five feet is a good height for this animal, and no great difference is observable between the sexes. This height is a matter of measurement rather than of observation, however, as the chimpanzee rarely stands upright, and habitually walks bent over and supporting itself upon its long forearms and knuckles, the fingers being bent in; most of its time, indeed, is passed in trees. The range of the genus extends from the Atlantic coast of mid-Africa eastward through the forest region to the Nile, from about 10 degrees south to 12 degrees north of the equator. Throughout this great area it seems to be fairly numerous, and is known under many names; the probability favoring the reality of a second species, discriminated by Du Chaillu as the bald chimpanzee (*A. calvus*). They are strictly forest-dwelling animals, haunting the densest jungle and climbing to the topmost branches, where they go about in families or small bands, feeding almost wholly upon soft fruits, but varying their diet with grubs, insects, honey, birds' eggs, fledglings, birds, etc. This appetite causes them to wander widely in search of fresh food, and in some districts they are greatly destructive of the banana and other plantations of the natives. Simply guarding these plantations, when the fruit is ripe, is usually sufficient to save the crop, since the apes are timid toward men and run when they can; but if cornered they prove very troublesome foes to deal with, showing much courage, and seeking to grasp their enemy in their long arms, chew his hands, and gash his throat with their terrible teeth. Dr. Livingstone and others say that the chimpanzee is a match for the leopard, but is quickly killed (but not eaten) by the lion. The robust natives of the central Sudan chase these animals into the tree-tops, drive them into traps, and otherwise kill them off by regular hunts. They seem to be largely nocturnal, and often fill the woods with loud, reiterated cries, which are varied through every variety of horrid noise; can be heard a long distance, and seem to be uttered by large troops in concert, though perhaps only a few are really screaming and bellowing together. Such noises doubtless serve the double purpose of keeping the apes wandering through the blackness of the forest night, within hail of one another, and of terrifying possible enemies. No particular sleeping-place seems to be made by this ape, but when one is about to become a mother, the pair build a platform-like nest in a tree-top, upon which the female rests until her young one (twins are only occasional) is born and able to travel. The young are often captured and kept as tame pets, by the negroes and wandering Arabs; and thus for two or three centuries the civilized world has been supplied with living examples.



DENTITION OF CHIMPANZEE.

No other of the greater apes is so human in its characteristics, appearance, and intelligence, and numberless accounts exist of the interesting ways and great docility of the animal when properly treated and trained. Though it often becomes morose and savage when old (if able to survive the pulmonary diseases which kill most of its kind in youth), when young it is teachable, affectionate, and playful to a remarkable degree. "Even in a wild state," remarks Wright (*Riverside Natural History*, Vol. V., p. 526; Boston, 1884), "the chimpanzee appears to indulge the instinct of play, which renders it such an attractive inmate of the zoölogical garden. Savage . . . describes how a hollow tree may be used as a drum to call the young ones to play, and how the old folks sit around keeping watch, and ready to administer a rebuke if deserved. So entirely human are the chimpanzees in their ways, that the natives of certain tribes believe them to be relations which have been degraded from a former higher state to their present forest life."

The structural resemblance to the gorilla has been noted; but the head is rounder, and the face lacks the great ridges above the eyes and massive jaws of that animal, and the canines are smaller, while the lips are more extensile and mobile, and the whole expression milder; the ears are very large and the nose insignificant. The naked skin of the face is yellowish, darkening with age, but that of the palms of the hands and soles of the feet much darker; and gray hairs often become conspicuous about the mouth and chin. The body is covered everywhere else with shining black hair, most abundant on the head and shoulders, where it hangs long and thick.

Much has been written as to these animals, especially in the works of Savage, Du Chaillu, Livingstone, Schweinfurth, and other explorers of western and central Africa; also in regard to chimpanzees in captivity. A good general account is contained in *Cassell's Natural History*, Vol. I. (London, 1883); and a more scientific one in Hartmann's *Anthropoid Apes* (New York, 1886), where a full account is given of 'Mafuka,' the supposed hybrid between gorilla and chimpanzee, long resident in Dresden. A famous educated captive, 'Sally,' lived for eight years in the London Zoölogical Gardens, and was the subject of psychological training and experiment, described by Romanes in the *Proceedings of the Zoölogical Society of London* (1889); and the history and exploits of another celebrated chimpanzee, 'Joanna,' are recorded in the same *Proceedings* (1899, p. 296, et seq.). See Gorilla and Orang-utan; and Plate of Anthropoid Apes.

CHI′NA. See Chinese Empire.

CHINA, and **CHINAWARE.** See Pottery.

CHINA BARK. See Cinchona.

CHINA CINNAMON. See Cassia.

CHINA CLAY. See Clay; Kaolin.

CHINA GRASS, or **CHINESE GRASS**. The popular name of a fibre used in China for the manufacture of a beautiful fabric known as grass-cloth. The name appears to have originated in the belief that the fibre was that of a grass; but this is not the case, it being obtained from *Bœhmeria nivea* (q.v.), a plant allied to the nettle. Grass-cloth is now brought in considerable quantity to stores, especially in the form of handkerchiefs and other textiles. It has a fine glossy appearance and a peculiar transparency. See Bœhmeria; Ramie.

CHINA INK. Another name for India ink (q.v.).

CHINANDEGA, chē′nän-dā′gä. A town of Nicaragua situated 25 miles northwest of Leon, and connected with the Pacific coast by railroad (Map: Central America, D 4). It is the capital of a department of the same name, is the centre of a corn district, and has considerable trade. Population, 12,000.

CHINA SEA, or South Sea. A partially inclosed sea, lying off the southeastern coast of Asia (Map: Asia, L 7). It is bounded by China and Formosa on the north, where it connects by the Strait of Formosa with the Eastern Sea; by French Indo-China, Siam, and the Malay Peninsula on the west; and by the island loop of Borneo and the Philippines on the south and east. On its western border are the indentations occupied by the Gulf of Siam and the Gulf of Tongking, the latter being partly shut off by the island of Hainan. The sea increases in depth from south to north; soundings of more than 13,000 feet have been made off Luzon, but much of the southern portion has a depth of less than 1000 feet. Typhoons of great violence endanger navigation during certain seasons. The chief ports on the China Sea, or close to it, are Manila, Singapore, Bangkok, Saigon, Canton, and Hong Kong. The largest rivers draining into it are the Mekong, Menam, and the Si-kiang, or West River. With the exception of Hainan, there are no large islands.

CHINA TREE, Pride of India, or Persian Lilac (*Melia azedarach*). A handsome tree, a native of India and Persia, and the type of the natural order Meliaceæ. The tree is widely distributed throughout the warmer portions of the globe. It grows to a height of 30 or 40 feet, and has bright-green compound leaves and fragrant lilac flowers. It resists drought and is highly thought of as a shade-tree in regions adapted to its requirements. It will withstand considerable cold, but cannot be recommended for regions where freezes are frequent. The abundant lilac-colored flowers appear early in the spring, and the leaves are retained late into autumn, followed by the attractive clusters of berries, making the tree attractive at all seasons of the year. The wood is rather coarse, but durable and handsomely marked, making it valuable for cabinet use. The leaves, flowers, and berries are reputed to have medicinal properties, although not recognized in some pharmacopœias. In Australia the tree is known as white cedar, and its uses are numerous. A number of forms of China trees are common in cultivation, one of the most handsome being that known as the Texas umbrella-tree. Its spreading habit and dense foliage make it one of the most desirable shade-trees known.

CHINA WAX. The secretion of an insect (Coccus) which lives on the ash-trees of China. See Wax.

CHINCHA ISLANDS, *Sp. pron.* chēn′chä. A group of three small islands in the Pacific, near latitude 13° 40′ S. and longitude 76° 30′ W., 12 miles from the coast of Peru (Map: Peru, B 6). The area of the entire group is only about 4000 acres. The surface is rocky and devoid of vegetation. The islands were of some importance formerly, due to immense guano deposits which began to be exported by the Government in 1840, and were exhausted by 1874.

CHINCH-BUG (from Sp., Port. *chinche*, It. *cimice*, from Lat. *cimex*, bug, and Engl. *bug*). A small blackish bug (*Blissus leucopterus*), with white wing-covers marked with a 6-shaped dark line. It belongs to the Lygæidæ, one of the most extensive and injurious families of plant-bugs, of which some 175 species belong to North America. The chinch-bug is spread all over the United States and throughout Central America and the West Indies; and is the most destructive bug, and probably the most destructive insect in the country, especially in the Mississippi Valley. It appears in incalculable numbers in dry seasons, and the Department of Agriculture places the average annual damage at $20,000,000. The adults live through the winter in old grass and rubbish. Early in the spring the female lays 500 or more eggs on the roots and stems of grain. The young, at first, are red in color, and, clustering in crowds on the stems and leaves of grain or maize, suck out the juices and kill the plants. Wheat suffers most. There are two generations in a year. When arriving at maturity the broods scatter, and should a strong wind be blowing at the time the insects are on the wing, they may be blown or carried many miles. Wet and cold springs and severe winters help to keep down the number of this pest. In Kansas several contagious diseases that attack this bug have been discovered, and to facilitate the spread of such diseases infested chinch-bugs are sent to various parts of the State with alleged encouraging results. Several illustrated monographs of this species have been issued, of which the most complete is that by F. M. Webster, *The Chinch-bug* (Department of Agriculture, Washington, 1898).

CHINCHILLA DE MONTE-ARAGÓN, chĕn-chē′lyȧ dȧ mōn′tȧ ä′rȧ-gōn′. A town of Spain, in the Province of Albacete, 10 miles southeast of the city of that name (Map: Spain, E 3). It is surrounded by walls, and has a castle. It has manufactures of cloth, linen, leather, earthenware, and glass, and a trade in the agricultural produce of the district. Population, in 1887, 6096; in 1900, 6544.

CHINCHIL′LA (Sp., from So. Amer. Indian). A small South American rodent allied to the cavies, but outwardly much resembling a ground-squirrel, which represents an extensive family (Chinchillidæ). All the species are gregarious; feed much on roots, for which their strong and sharp incisors are particularly adapted; and live either in holes, which they select for themselves in rocky districts, or in burrows, which they excavate. They are valued for their fur, particularly the chinchilla of the Andes (*Chinchilla lanigera*), whose mouse-gray and extremely soft and lustrous fur constitutes an important article of commerce, but their numbers are said to be perceptibly decreasing. The ancient Peruvians were accustomed to employ the wool of the chinchilla for the manufacture of fine fabrics. See Plate of Cavies.

CHINDWARA, chīnd-wä′rȧ. The capital of a district of the same name in the Nerbudda Division, Central Provinces, British India (Map: India, C 4). It is situated in latitude 22° 3′ N. and longitude 78° 58′ E., occupying a plateau amid the Deoghur Mountains, 2100 feet above the level of the sea. Its climate is one of the most agreeable and salubrious in India, and attracts many visitors in search of health or recreation. Area of district, 4631 square miles. Population, in 1891, 407,500; in 1901, 408,100.

CHINESE ARROWROOT. See Nelumbo.

CHINESE ART. For the purpose of this inquiry the history of China may be said to begin with the Dynasty of the Han and the accession of Kao-Tsou about B.C. 200. Some very interesting sculptures on sandstone, parts of family tombs, brought together long afterwards by native antiquarians and preserved in the Province of Shantung, are the earliest works of the kind which it is possible to date even approximately. But it is observable that in this, the earliest piece of ancient art so far examined, we have something which remains in a seaboard province and within a few hours' ride of a great thoroughfare. The same peculiarity obtains in whatever is known of Chinese architecture, architectural sculpture, and fixed and permanent art of any sort; it is close to some great centre never wholly closed to Europeans. What the vast territories of the empire contain, and what its swarming millions have produced during the two thousand years of record and the thirty centuries of legendary history, is not as yet ascertained. No residents of China and no travelers from European lands have given to the world a full account of the remains in even one province; and even the external appearance of buildings in the remoter provinces is known only from very recent photographs taken by casual passers-by. In fact, archæological science has not been introduced into the study of Chinese buildings and ruins, and the slightest observation has been accepted as complete and as containing truth applicable to the whole empire.

The famous Great Wall of China is generally thought to date from the close of the Third Century B.C., but this, in spite of its vast extent and the evidence it gives of much practical capacity among large classes of the population, is not in any sense a work of fine art, nor is it equal, in any part of its length of some 1500 miles, to the walls and gates of the greater cities. It does, however, enable us to accept more readily the extraordinary tales of important works done by the first Han Emperor, Kao-Tsou, already named, especially in the way of bridges built over the numerous watercourses of the central and western provinces of the empire. These bridges were sometimes massive, rivaling modern engineering works in the prodigious amount of labor and expense involved, and sometimes of light material and hung in air over mountain torrents.

Architecture. Architecture in the usual sense is not known to have been carried to important results in China before the appearance there of the Buddhist influence in the course of the First Century A.D. Then Indian types were introduced and the Taa or pagoda of Chinese form appeared; although none of such early date has been identified. These towers, as they now exist, are usually constructed of brick, which material is concealed in many cases by an elaborate facing of what are spoken of as 'tiles,' but which are frequently very massive and of elaborate form, embossed with sculptured designs very richly painted. Others exist, which are built chiefly of stone. Some reach the height of thirteen stories; but this seems to be unusual.

The roof is far more prominent in Chinese architecture than in that of Europe; and the roofs must have been always of wood, as they are to this day: round logs of no great size, or lengths of bamboo. The curious and often noted tent-like form of these roofs with hollow curves, the steep pitch of the upper part, growing less and less until the broad eaves are almost horizontal, are not to be ascribed to any attempted imitation of the actual tent of canvas or textile material. They are unquestionably the result of the peculiar framing of the roof, which, whether built of hollow bamboos or of light solid pieces, whether squared or preserving the natural form of the log, is constructed in a way altogether different from that used in the roof-building of Europe. The artistic importance of these roofs, their value, individually or in groups, and their novelty to Europeans, have led to a hasty assumption that Chinese architecture takes its forms and its design mainly from original timber building. Of this, however, there is no evidence; bricks are known to have been used in great abundance in China at an epoch long before the commencement of our era, and skill in handling granite and stratified stone is traditional. Wood must have been common, from an antiquity comparable to that of the buildings of Chaldea.

As to the general plan of buildings, it is evident that from the beginning until the present time the Chinese idea of a residence has been nearly that which the peoples of the Mediterranean held during the years of classical antiquity; and that the Chinese palace and temple have been what those of the Mediterranean world were until the time came for competition between towns and States in the way of more striking and more permanent structures. A Chinaman's house, if he is a rich man, is a group of small one-story buildings interspersed with gardens, all within a bounding wall. Precisely the same tendency is visible in the temples of China, the 'pagodas' or tower-like structures of whatever form being decorative and symbolical accessories, like the church-steeple in a village of low wooden houses in America. In such low buildings the roof is, of course, the most visible and striking feature, and the fact that the forms of this roof interested the builders and became the dominating element in their design, even in the towers, is in no way surprising. We see this in full glory in Japan down to an epoch now scarcely closed. (See JAPANESE ART.) The construction is unlike that of Europe, inasmuch as it ignores diagonal bracing and substitutes for it a steplike series of vertical struts and horizontal ties. Thus, if we have to carry a pair of sloping rafters, these rafters are, in Europe, secured at the top of the wall and again where the two rafters meet at the ridge; but the Chinaman supports each rafter at four, five, or six points in its length, and thus prevents it from having any tendency to push sidewise. The purlins, or long horizontal pieces which carry the light outer rafters and the roof-covering, are supported in Europe by the main rafters of the truss (see ROOF), but in the East on the successive steps resulting from the square-framed structure. The scientific construction of Europe is so entirely identified with the triangle (see ROOF; TRUSS) that we can hardly imagine wooden architecture which ignores it; and yet such buildings in China and Japan have been found to last a thousand years in perfect condition.

The monumental gateways of China have always been admired by Europeans. The term *pai-loo* is applied to these, although some writers use that term for such a gateway when having several divisions, and *pai-long* when there is but one opening or passage. The pai-loo on the road leading to the tomb of the Ming emperors is of marble and has five openings; another, at the entrance of the Chun-Tsiang-Cha, has three round arches, and the one called the Porcelain Gate has three pointed arches—all these being in Peking. There is a great pai-loo of granite in the city of Ning-po, and several in the southern provinces are elaborately worked in marble. These gateways are frequently set up as memorials, approved by the sovereign as deserved by one of his subjects.

Although public buildings are very commonly devoid of great massiveness and of that kind of dignity which comes of ponderous and enduring structure, this is replaced very largely by elaborate surface decoration. For this purpose the unequaled skill of the Chinese in all forms of ceramic art, their great power as decorative sculptors in wood and stone, and the knowledge and taste they show in painting in permanent colors by a method which we call roughly 'lacquering'—though in reality lac does not enter into it—give their permanent decoration great value. Wooden screens and partitions, verandas and garden houses, receive exquisite adornment in modeled and colored patterns, the use of textile fabrics and enameled tiles.

PAINTING. The art of painting, in a large and complete sense, is known to have existed in very early times. It is evident from history and legend that the artistic painting of the epoch already alluded to as that of the Han Dynasty was descriptive, emblematic, decorative in a large way as well as in minute refinement, and the subject of great admiration and care among the learned of the country. The stories about the early painters bear a curious resemblance to the stories about the Greek painters of the great epoch. We have the paintings of a somewhat later time in great abundance, and their relation to the earlier ones is known to be close. Native and Japanese engravings and woodcuts preserve for us the compositions of Chinese pictures of the Eighth Century A.D., and prints from these are not inaccessible. The same extraordinary power of expressing with a few lines the important artistic facts of a landscape, of a flying bird or of a group of flowers, and the same inadequate drawing of the human form and of the higher orders of quadrupeds that have become familiar to us in more recent Japanese art, are noticeable in these ancient works. Change and the development of one style from another are as familiar in the far East as in Europe, and as easily noted by those who make a special study of them; but to the observer who is accustomed to European art alone the modifications are not very noticeable. All fine art is based upon a series of conventions; and to many Europeans who have grown familiar with the conventions of Eastern art these seem even less fixed and absolute and are accepted more readily than those of Europe. Thus the erroneous idea that "the Chinese don't understand perspective" is based upon an assumption that the perspective of European painting is actually correct. In like manner the absence of cast shadows in Chinese paintings gives a false idea of the art to those persons who are unaware of the like avoidance of shadows in European art. There are none in book-illumination, none in the painted miniatures from the Eighth to the Fifteenth Century, and none in glass-painting even of the richest and most elaborate sort. Modern mural paintings are often so composed in form and color as to avoid the appearance of shadow.

SCULPTURE. Sculpture, in China, is identified with movable pieces, of decorative effect, more than with architectural enrichment or with close representation of nature. Wood-carving and elaborately wrought modeling in clay, which is afterwards fired, and the surfaces painted and glazed, are carried to a refinement unknown in Europe. The carving of hard stones, like jade and rock crystal, and soft stones like opaque, veined talc and steatite, and of ivory, is an art especially identified with China. Jade carvings are of great elaboration, as where a single piece containing 250 cubic inches is wrought into two complete vases, side by side and separated from one another, except as leaves and twigs, all cut out of the solid mass, connect them.

The bronze industry is closely connected with sculpture, for it is the extreme skill of the modeler which has made the Chinese bronzes famous. Vases are preserved which are undoubtedly two thousand years old; but the production of large and small pieces has never ceased. A little figure four inches high, as of a priest or a worshiper, will be full of movement and energy, and of pathetic or humorous expression; and in like manner the basin of a fountain six feet across and half as deep will be a single casting, perfectly formed and flawless.

APPLIED ARTS. In China the arts of molding and baking clay and of adorning the objects so made by painting is of unknown antiquity, but pieces exist which can with safety be dated several hundred years B.C. The famous and peculiarly Chinese discovery of porcelain (q.v.), which is nothing more than pottery made from a peculiar clay and with a peculiar glaze, although claimed by Chinese authorities for an epoch many hundred years B.C., cannot be definitely fixed before A.D. 960, although there is no doubt that it was known before that time. From that time on till the Fourteenth Century it is thought that decoration in color was applied only in the glaze covering the whole surface or large parts of the surface; but, of course, no such assertion can be verified. During the Ming Dynasty, beginning in 1368, the full glory of Chinese painted decoration on ceramic ware, and especially on porcelain, was reached. The method of decoration is briefly this: upon the partly baked or slightly baked body of the piece, painting is done in one of several shades of blue, that being the only color which will bear the heat of the furnace to which it is to be exposed. This being fired, the glaze is applied over the blue painting, and the piece may then be finished. It is, however, common to paint the piece again, upon the glaze, with enamel colors, that is to say, colors which will fuse at a much lower heat than that of the original and the later firing already described, and which, moreover, are more or less translucent in their nature. Thus a fine Chinese bowl will have two systems of decoration combined into one polychromatic design, the blue shows through the glaze and acts as the outline or skeleton of the design, and upon this and mingled with it is an elaborate pattern in red, green, yellow, each of several tints. This pattern is graded not only by the difference in the color, but also by the amount of heat to which it has been exposed, and again, by the greater or less thickness of the coat or bed of semi-translucent color through which the bluish white surface of the glaze itself is seen. To persons who have studied other ceramic arts of great importance, and especially the art of Persia, the painted 'overglaze' decoration of even the finest Chinese vases and tiles seems hard. The outlines are uncompromising; the flower is raised a little above the smooth surface around it, and its edge leaves no doubt as to the place of beginning of the colored surface which stands for a petal or leaf. This, in contrast with the exquisite clouded gradations of the finest Persian wares, seems cold and formal to many European students. The coarser potteries of China are free from this fault, but they have been little studied in Europe.

It is in enameling upon metal and in textile fabrics and embroidery that Chinese art as known to Europeans is most attractive. The enameling is done as the same work is done in Europe; the substance, a kind of soft glass, is ground fine, mixed with some viscous material, and applied with the brush to the surface to be covered. This, put into the enameling furnace, which is not of very great heat, fuses and then hardens completely, producing, as the decorative artist wishes, an opaque or a translucent superficial adornment. The custom in China is to use what is known as the cloisonné method (see ENAMEL), and in carrying out the designs in this material the Chinese use strong and vivid colors to an extent much exceeding the practice of the Japanese or other Eastern nations. In fact, the Chinese are the greatest masters of chromatic effect in pure strong color—dark and light blue, dark and bright red, green of two or three tints, dark yellow, light yellow, and the golden effect given by the metallic edge, which may be of brass or may be gilded—all these go to make up a color harmony which the workmen of no other nation succeed in so well as do the Chinese.

Somewhat the same merit is seen in their textile fabrics, especially in their silk-weaving. Many processes are used and the weaves are sometimes extremely elaborate, as in the case of velvet with pile upon pile (see VELVET), and in those curious figured and flowered silks in which there is a decided break or opening between the threads which form one part of the pattern and those of another part or of the background. Embroidery in the hands of the Chinese is as it were an enlargement of the field of textile fabric, for it is used continually to help out and make still more decorative a piece which, as it leaves the weaver's hands, is already very rich.

During the recent centuries of decay and collapse the arts of China have suffered a great eclipse, and it has seemed at times as if no more fine porcelain or enamel was, or would be, produced. But even in our own time there has been a marked increase in the number of exports of such fine wares, and although these are apt to be copies of ancient work, there is nothing except European commercial influence to prevent a rebirth of native art.

BIBLIOGRAPHY. The most important work by a European on the arts of China is Bushell, *Oriental Ceramic Art: Collection of W. T. Walters* (New York, 1889), an expensive folio which contains many excellent chromo-lithographs. Monkhouse, *A History and Description of Chinese Porcelain* (New York, 1901), to which Dr. Bushell has also contributed, is valuable, both for its text and its illustrations, although it lacks unity. After that of Dr. Bushell, the most important work on Chinese pottery and porcelain is Grandidier, *La céramique chinoise* (Paris, 1894). Gulland, *Chinese Porcelain* (London, 1898), gives interesting descriptions, but shows an inadequate comprehension of the significance of Chinese art. It is illustrated from photographs. More truthful than photographs in some ways are the admirable etchings by Jules Jacquemart, in Jacquemart and Le Blant, *Histoire de la* *porcelaine* (Paris, 1862). Paléologue, *L'art chinois* (Paris, 1888), one of a set of the *Bibliothèque de l'enseignement des beaux-arts*, is a convenient handbook. The special excellence of Chinese artists, their great ingenuity and taste in producing surface ornamentation in color, is well exemplified in Owen Jones, *Examples of Chinese Ornament* (London, 1867). William Anderson, in his *Catalogue of Japanese and Chinese Paintings in the British Museum* (London, 1886), and in the elaborately illustrated work *The Pictorial Arts of Japan* (London, 1886), deals with Chinese pictorial art in color and in monochrome.

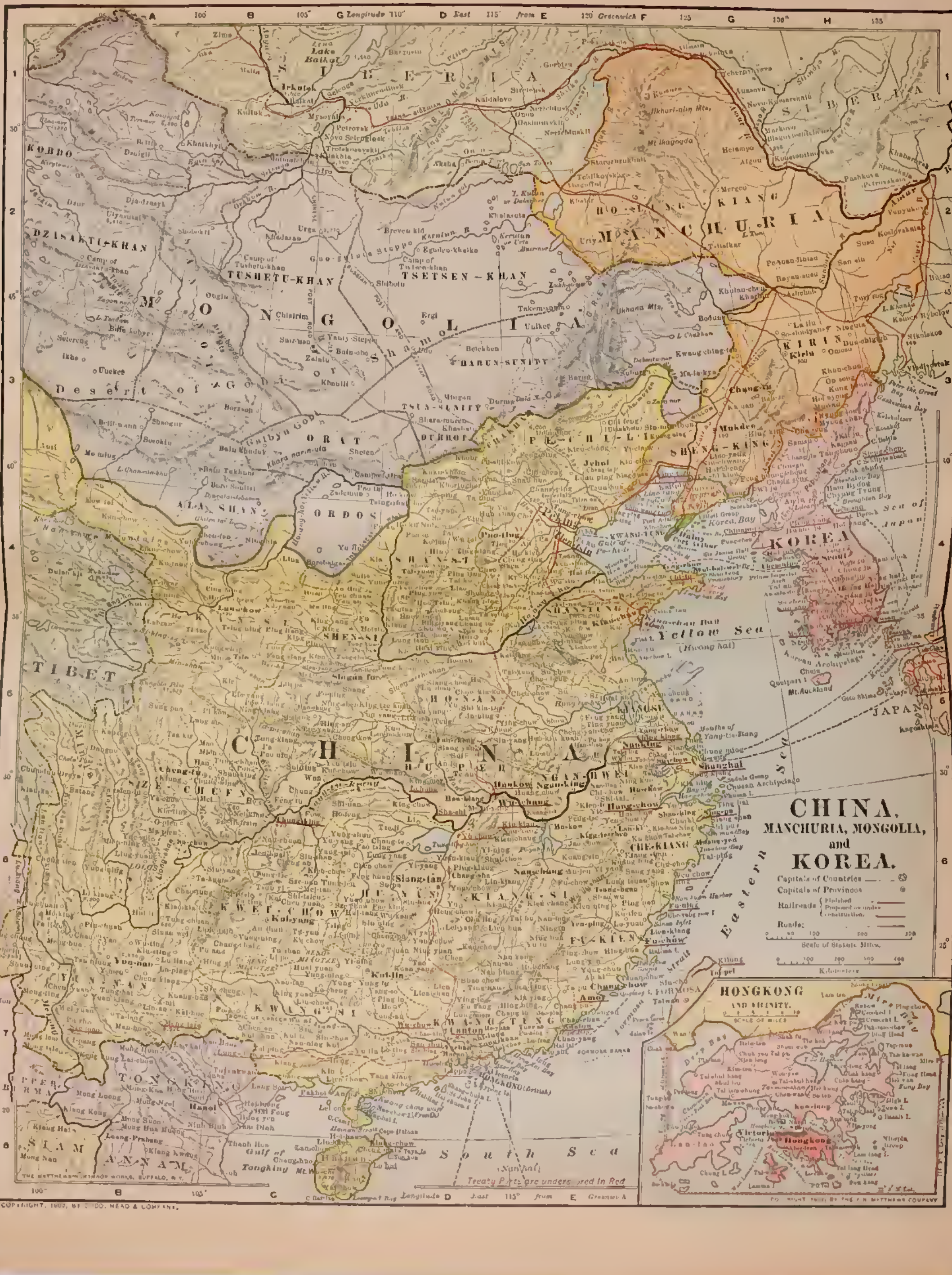
Chinese architecture in the strict sense has hardly been treated by Europeans. There are several essays scantily illustrated in the *Publications of the Royal Institute of British Architects* (London, 1866-67, 1873-74, and 1895). The *Dictionary of Architecture* of the Architectural Publication Society of London, Vol. II. (published about 1865), contains an essay on Chinese architecture which summarizes the small amount of knowledge then existing. The separate paragraphs are signed by different writers, but the name of the editor is not given. There is little of more recent date. Choisy, in his *Histoire de l'architecture* (Paris, 1899), has given a short but trustworthy analysis of Chinese methods of building, and of the resulting architectural effect. Viollet-le-Duc, *Histoire de l'habitation humaine* (Paris, 1875), though with a more popular treatment, shows an almost equal understanding of the earliest construction in bamboos and round timber of small scantling. Cram, in the *Dictionary of Architecture and Building* (New York, 1901-02), has summed up accurately what is really known of Chinese architecture, and his article on Japan in the same work continues the subject.

CHINESE EMPIRE (Fr. *Chine*, Med. Lat. *China*, Ar. *Sīn*, Pers. *Chīn*, Skt. *Cīna;* Gk., for the people, Σῖναι, *Sinai*, Σῆρες, *Sēres*, Lat. *Seres;* Turk. *Khatai*, Mongol. *Kitat*, whence Engl. *Cathay*, Russ. *Kitai*, from the race, generally held to be Tungusic, of *Kitan*, or *Khitan*, who ruled in the north of China from the Tenth to the Twelfth Century; the natives call their country *Chung-Kwo*, 'Midland,' poetically *Chung-Hwa*, 'Flower of the Middle,' or *Ta-Tsing-Kwo*, 'Realm of the Great Light,' an appellation applied to the empire *in toto*, and one which shows the origin of the word *China*). An imperial domain extending over most of the southeastern third of Asia, and embracing the whole area of continental drainage into the Pacific south of the Amur River, with the exception of Indo-China. It has an estimated area of about 4,225,000 square miles, and an estimated population of 400,000,000 souls. It is irregularly circular in shape, lying between latitudes 18° and 54° N. and longitudes 74° and 135° E.; and it includes, besides China proper and Tibet, Eastern Turkestan, Mongolia, and Manchuria. These dependencies are described under their names, and need here only a few words.

Tibet is an elevated, cold, and largely sterile plateau, surrounded by lofty mountains; and Eastern Turkestan is an elevated and almost waterless basin (the Tarim) northwest of Tibet. Its northern border is the gigantic Tian Shan range. An area of elevated desert plateaus (including the Desert of Gobi, or Shamo) north of Tibet and China proper is known as Mongolia (or Sungaria at its western end). It is bounded on the east by the north and south Khingan Mountains, between which and the coast lies Manchuria. All of these regions are habitable only in limited districts, and support a scattered native population under the nominal control of China; while they represent in space two-thirds of the Chinese Empire, they amount hardly to a tenth of its population or resources, the other nine-tenths belonging to China in the common and restricted meaning of the term.

China Proper. This is the compact, roughly quadrangular area forming the southeastern third of the empire, extending from the coast (some 2500 miles in length) westward to the lofty and crowded mountain ranges that form the eastern border of the Tibetan Plateau, and northward to the southern border of Mongolia. The only artificial boundary is the comparatively short one between China and Tongking. The total area of China proper is estimated at about 1,500,000 square miles, or about one-third of that of the whole empire, and within this area is included all but three or four per cent. of the total population of the Chinese Empire. The whole circuit of the land frontier (about 4500 miles) consists of almost impassable mountains and deserts, which from remote antiquity have effectually cut off this corner of the world from interchange of people, products, and ideas with other regions and races; from this physical isolation have arisen most of the peculiarities characteristic of Chinese civilization and manner of thought. The vast mountains and plateaus between China and Tibet cover a wide area, and send many spurs eastward and southward, especially into north-central China, where the Kuen-lun is prolonged eastward in two lines, which diminish to hills toward the coast, but rise again in the Shantung Peninsula. Similarly, the Himalayas are continued across the southern part of China in reduced and broken lines of elevation, and this prolongation then sweeps northward in the prominent range which reaches from Canton to Ningpo, outside of which is the coast region of Fukien. Southwestward of all lie the heights that form the northern backbone of Indo-China.

These primary east-and-west lines of mountains divide China into three great valleys. The southernmost, south of the Himalayan extensions, is that of the Si-kiang, which drains the two Kwang provinces into the sea at Macao. North of its watershed between the Himalayan extensions and the central Kuen-lun extensions lies the valley of the Yang-tse-kiang, which is the most densely populated, highly cultivated, and important part of the whole empire. This mighty river, exceeding 3000 miles in length, originates in central Tibet, and flows through hundreds of miles of self-eroded mountain valley, leading first eastward, then southward to northern Yun-nan, then northeastward through the cañons of the Province of Sze-chuen, until it finally reaches the plains and traverses them to the Yellow Sea. It has many names, but all recognize it as Ta-kiang—'great river.' As far up as Hankow-Wu-chang (500 miles) it may be navigated by ocean steamers; still farther, 363 miles up to I-chang, by smaller vessels. There the gorges begin, and further navigation is by handboats, which often must be hauled along the bank. Like all snow-fed rivers, the Yang-tse-kiang is subject to sudden floods, which often amount to 50 feet as far down as Hankow; a resultant compensation, however, is the constant renewal of fertility to the



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flooded lands, which enables them to be incessantly cultivated by a dense population. The largest lowland tributary of the Yang-tse-kiang is the Han, which drains the interior valley of the double Kuen-lun extension.

North of the watershed of the Yang-tse-kiang, occupying the northern quarter or third of all China, is the vast basin of the Ho-ang-ho, a river hardly inferior to the Yang-tse-kiang in size or economic importance. It also forces its way out from its lofty Tibetan birthplace through hundreds of miles of mountain gorges, makes a long detour to the north, then flows for a great distance due south, after which it turns abruptly to the east, and finally flows due northeast to the Gulf of Pe-chi-li. Down this vast stream come floods from the melting of snows or from sudden storms in the mountains along its upper course; and frequently so overwhelming are the resultant inundations, in spite of marvelous works for the restraint of the waters, that thousands of lives are lost, and sometimes widespread famine follows the desolation of the land.

While mountains and hills fill the western two-thirds of China, and cultivation is possible only in more or less spacious valleys, the eastern third of the country, except near the south coast, is mostly level plain, divided into the two vast lower basins of the Yang-tse-kiang and Ho-ang-ho, plus those of some lesser sea-flowing rivers. This plain reaches inward for 500 miles on the Yang-tse-kiang and 600 on the Ho-ang-ho, and is so low that these rivers, as far up as Hankow or Si-ngan-fu, are only about 150 feet above the sea. Hence their current becomes very slow, a freshet overspreads broad areas, the silt brought down is rapidly and evenly deposited, and the rivers have in times past extended over their respective plains and formed vast deltas. The Ho-ang-ho has repeatedly shifted its main mouth from north to south of the Shan-tung Peninsula and back again. In addition to this alluvial deposition, vast quantities of wind-blown dust from the deserts and mountain-sides of Tibet and Mongolia have for ages been falling upon the ever-growing coast plains, constituting what is known as the 'loess.' (See paragraph on *Geology*.) Subordinate drainage basins of less extent are those of the Pei-ho, in Pe-chi-li; the Hwai-ho, in Ho-nan, consumed in irrigation works; and the small coast streams cut off from the Yang-tse-kiang basin by the coast range that runs from Hong Kong to Ning-po. The coast is broken with many bays and gulfs, and a number of fairly good harbors. On the north is the Gulf of Pe-chi-li, with its arm, Liao-tung Gulf. South of the mountainous Shan-tung Peninsula is the Yellow Sea, and in the south coast is the Gulf of Tongking. Of islands, the largest is Hainan, off the southern coast.

The lakes of China are almost all near the mouth of the Yang-tse-kiang, the largest having a circumference of about 220 miles, and named Tung-ting-hu, so called because it was considered the cradle of the aboriginal kings. Po-yang-hu, 90 miles long, has its outlet in the Yang-tse-kiang, and is famous for its beautiful scenery and its picturesque islands. In this lake there are, in addition to those islands formed by nature, artificial floating islands on which farmers build habitations and raise crops, cattle, and fowls. The lakes of Kiang-su are important as reservoirs for the Grand Canal. The Grand Canal, running from Hang-chow to Tien-tsin, but practically serviceable through its feeders from Nanking to Peking, was formerly the route of the great fleet of vessels bearing the tribute of rice to the capital. Artificial rivers and canals greatly aid navigation in China.

The Great Wall. The Chinese rarely use stone for architectural purposes, except in commemorative arches and bridges, and chiefly for trimming or paving; they are much given to the use of brick. The great wall is surfaced with brick. This wall, one of the most stupendous works ever conceived and executed by man, was primarily erected toward the close of the Third Century B.C., in sign of the destruction of the feudal system in China, and of the unification of the many provinces into an empire by the first She-Hwang-Ti, or universal emperor, one of the Tsin dynasty. It has been preserved and extended through many reigns with the futile idea of keeping back the Tartars. About the year 1547, under the Ming Dynasty, its length was increased by about 300 miles. At the present time it is, along large parts of its course, little more than a mass of débris. It is 25 feet thick at the base and 15 feet at the top, with towers at intervals of about 100 yards. It is about 1250 miles long, stretching over high hills and very deep valleys and across rivers. Beginning at the western frontier of Kiang-su, it follows the general eastward trend of the mountains, making great bends north and south. In Shan-si it has a long loop embracing over half the province, and forming double walls many miles apart. It reaches the sea at Shan-hai-kwan.

Climate. China lies mainly in the north temperate zone, the extreme southern portion only being within the tropics. Lying on the eastern side of the continent, with most of its area within the region of the prevailing westerly winds, it has a continental climate, with considerable range of temperature throughout the year, except upon the immediate seacoast. The mean annual temperature at Peking, in the north, is 51°, at Canton, in the south, 69°. At Peking the monthly range of temperature is from 79° in July to 23° in January, while at Canton the corresponding figures are 82° and 55°. The temperatures at Canton are greatly modified by the monsoon winds, to which the southern coast is exposed. Inland the range of temperature is much greater.

The rainfall is greatest on the south coast, where it often exceeds 100 inches annually, and diminishes northward. At Hong Kong it is 90 inches, at Peking 24 inches. It is greatest on the coast, and diminishes inland over the inhabited areas, though it is in most parts of China, and in most years, sufficient for the needs of agriculture; still, disastrous local droughts have occurred, and, owing to lack of means of communication, have caused serious famines. Most of the rain falls in the summer months, being brought by the southwest monsoons.

Flora. Tea, rice, and bamboo are the three most valuable vegetable products—the first for drinking (not usually taken at meals), the second for food, and the third for the construction of habitations and implements. The vast area and climatic conditions of China allow a wonderful variety both of natural products and of products grown by man. Besides the timber forests, which are richest in the mountainous regions—most of the populous regions of China proper being comparatively treeless, except where there are fruit orchards—there are the tallow, varnish, and camphor trees, the pine and banyan, the cypress and mulberry. The mulberry is cultivated by the millions, but rather as a bush, and almost wholly for its leaf, which is the food of silkworms. In the south the cocoanut and other kinds of palm, with the subtropical fruits and nuts, are numerous. Among the fruits, those of the Occidental genera prevail in the north, such as apples, grapes, peaches, many excellent varieties having been introduced from America. In the south the oranges, pineapples, mangoes, li-chi, bananas, and many fruits of native growth without European common names, enable most of the inhabitants to enjoy fruit throughout the year. The bamboo, of which over sixty varieties have been described, is of all sizes, furnishing not only its young sprouts as food, but serving numberless purposes. What iron is to the American, bamboo is to the Chinese. It is used in the building trades, in the decorative arts, and in the manufacture of furniture and utensils, and especially of paper. It plays an important part in pharmacy. It furnishes themes for Chinese poets. "Order is maintained throughout the whole empire by it, and a sprig of it is borne in the van of the funeral procession." Many plants now common in the West, such as camelias, azaleas, and gardenias, are natives of China.

Fauna. The vast tracts of sparsely inhabited country, and the wide variations of elevation and climate, cause considerable differentiation in the fauna. Tigers, panthers, leopards, wildcats, civet-cats, tree-civets and martens, black and brown bears, twenty species of bats, several varieties of monkeys, wolves, foxes, antelopes, deer of eleven kinds, including three of the musk-deer, and, in Yun-nan Province, the elephant, rhinoceros, and tapir, are some of the wild animals. The water-buffalo, cattle and horses, sheep and goats, mules and donkeys, pigs of various varieties, weasels, otters, badgers, stoats, sea-otters, moles, muskrats, hedgehogs, hares and rabbits, a dozen kinds of squirrels, and twenty-five species of rats and mice are known. The lists of Swinhoe and David contain two hundred species of mammalia. Sea-food is so abundant that in Macao one may have a different kind of fish for breakfast every morning in the year, it is said. Porpoises, finwhales, eels, sharks, and sturgeons are numerous off the coasts; and alligators, snakes, frogs, and tortoises abound. Of birds, over seven hundred species have already been described. The entomology has been very litle studied. Locusts in swarms often do great damage, and scorpions, the mantis or 'praying beetle,' centipedes, fireflies, and beetles are found everywhere.

Geology and Mineral Resources. Our knowledge of the geological conformation of China is limited to the incomplete records of von Richthofen and a few other scientists who have penetrated into the interior, and to the reports of mining engineers on portions of Manchuria and China proper. It is known, however, that most of China is floored by geological formations of Mesozoic or older times, the only areas presenting earlier formations being the great plain of the lower Ho-ang-ho, and the smaller plain of the Yang-tse-kiang, which are covered by Quaternary deposits. The mountain ranges are composed of Archæan rocks, granites, gneisses, and schist or Paleozoic rocks, and the valleys of Paleozoic or Mesozoic beds. Perhaps the most remarkable and characteristic formation is the friable brownish-yellow earth called 'loess,' which forms a mantle several hundred feet thick spreading over the highest hills and deepest valleys, and, by its bold sculpturing into terraced and steppe-like prominences, making a picturesque landscape. The loess formation is particularly prominent in the provinces of Shen-si, Shan-si, Ho-nan, and Shan-tung, along the Ho-ang-ho Valley, where it occupies an area of many thousand square miles. The soil in these regions is exceedingly fertile; but, owing to its porous, absorbent character, a large rainfall is required to make it productive. Vast amounts of the loess are washed annually into the Ho-ang-ho and borne seaward by that river.

The most valuable of China's mineral resources are the deposits of coal, which are said to extend over more than 400,000 square miles, and to exceed those of any other country in the world. Coal is known to exist in every one of the eighteen provinces, but at present is mined in only a few localities. Among these are Kai-ping, in Pe-chi-li, Fang-shan (anthracite), Po-shan, in Shan-tung, Chang-kin, I-chow, I-sien, and Kan-su. Beds of anthracite are known to exist in eastern Shan-si, and of bituminous coal in the western part of the same province, each field being estimated to have an area of 13,500 square miles. Of metals China has been productive since remote antiquity. Gold is still washed from the sands of the Amur River in Manchuria, and along the upper course of the Yang-tse-kiang, and auriferous quartz veins are worked in the mountains of Pe-chi-li and Shan-tung. Mining as conducted by the natives, however, is exceedingly crude and on a limited scale. The workings are abandoned upon reaching water-level, and consequently the best mines have long been idle. The present annual output of gold probably does not exceed $3,500,000. Silver-lead ores are produced in Pe-chi-li and Yun-nan, the values in silver sometimes being as high as 500 ounces per ton. Copper-mines, of which some are under Government control, were exploited long before the Christian era, the metal being particularly prized for coinage purposes. There are rich deposits in Yun-nan and Hu-nan. Iron ore is found in Shan-si, in juxtaposition with coal. Tin and quicksilver ores are known to occur in extensive deposits, but they are wrought in small quantities and by crude methods. The salt-works of Sze-chuen present an example of a Chinese industry attaining a development comparable to that of the more progressive nations. Artesian wells are driven to depths of 1500 feet or more, to reach the brine, which is pumped through bamboo tubing and evaporated over furnaces, natural gas being used for fuel. From these works the salt is transported down the Yang-tse-kiang and marketed in distant parts of the empire. Within recent years foreign capitalists have endeavored to develop the mining industry of China, and some valuable concessions have been secured. Under these governmental grants active operations were begun in the mining districts of the northern provinces, but, unfortunately, the political troubles prevented a successful issue. It is certain that the industry will undergo rapid development as soon as a more stable condition of affairs is assured.

AGRICULTURE. China is essentially an agricultural country, the bulk of the people being tillers of the soil. Agriculture is held in the highest honor, the farmer ranking, in theory at least, next to the scholar, and before the merchant and artisan, in the four classifications of the people. With solemn ceremonies the Emperor, in the Temple of Agriculture in Peking, annually inaugurates the farming season at the spring equinox. China has a more equal distribution of land than any European or American nation, estates of a few thousand acres being rather rare, and a plot of 10 acres being considered a good-sized farm. Nominally the land belongs to the Emperor, and as a matter of actual practice a man's title to his land ceases as soon as he fails to cultivate it. Owing to the great congestion of population, extremely small subdivisions of acreage is the rule. However, as it results in a highly intensive method of cultivation, it is by no means an unmixed evil, for the land is cultivated with a care and an intelligence unrivaled in the world. The system of rotation of crops has been adopted since time immemorial, and such a high appreciation is shown of the value of fertilizers that no part of the animal and vegetable refuse is wasted. Not satisfied with cultivating every inch of fertile land, the Chinaman proceeds with wonderful patience and endurance to create artificial fields wherever he can find place for a layer of soil. Thus, it is a matter of common occurrence to meet in Chinese waters floating fields consisting of large rafts covered with earth. Another and more important extension of arable land is by means of the so-called terrace fields, which are formed by covering the mountain slopes with fertile soil. Even the shifting sand-fields are gradually converted into rich ground. The implements of the Chinese are crude and clumsy in construction. Irrigation is as highly developed as fertilization, and the whole country is covered with a network of canals and ditches —even the terrace fields on the mountain slopes are provided with an abundant supply of water.

The chief agricultural products of China are grain, cotton, and tea. Of grain, rice is the most important staple, and is raised largely in the middle and southern parts. In the north, wheat, corn, buckwheat, oats, and a little rice are produced. Tea is grown mostly in the south, although its cultivation is carried as far north as latitude 31° N. It is planted, as a rule, on mountain-sides sloping to the south, and in soil composed mainly of loam. The tea-bushes yield three crops a year—April, July, and August. (For further details, see article on TEA.) Cotton is raised as far north as the Province of Shan-si, but only in the low valleys here. The provinces in which it is considerably grown are Shen-si, Kiang-su, Ngan-hwei, Che-kiang, Hu-peh, Kiang-si, Hu-nan, and Kwang-si. Tobacco is cultivated throughout China, and the opium-smoking habit is responsible for an extensive cultivation of the poppy. Cane-sugar is successfully produced in four southern provinces—Che-kiang, Fu-kien, Kiang-si, and Kwang-tung; indigo in Che-kiang and Kiang-si; and hemp in two middle provinces—Hu-nan and Shen-si. The silkworm culture centres in the Province of Kiang-su. The vegetables include carrots, peas, cabbage, pepper, garlic, and beans. Stock-breeding claims little attention. Milk, butter, and cheese are practically unknown, and eggs, fish, and game are considered more important than the flesh of domestic animals.

MANUFACTURES. The Western world is under a great debt to China for many inventions which have been brought to Europe and there improved. For many centuries the Chinese alone had silk, paper, jade, porcelain, clocks, the art of printing, the magnetic needle, and gunpowder. They excel in whatever requires patience and routine skill; but since they regard originality as in bad taste, if not morally wrong, they make little mechanical progress. The favorite materials of their workmen are silk, cotton, linen, bamboo, clay, and wood. Printing by means of movable types was known in China from an early age, and many books thus made and still extant are older than the time of Gutenberg and Koster. However, the invention so strikingly useful in a system having but 26 phonetic letters, is of far less value when tens of thousands of characters are used. The making of porcelain goes back to very ancient times, Chinese scent-bottles with inscriptions having been found in Egyptian tombs as early as B.C. 1700. Their weaving, embroidery, engraving on wood, stone, and metal, fine gold and silver work, ivory-carving, lacquer-ware, and bronze-casting are worthy of high admiration. In recent years foreign methods and machinery have been introduced, but the results thus far seem to demonstrate that the Chinese, at least in the beginning of their newer industrial development, will need foreign guidance. Bricks, cotton goods, matches, powder, rifles, cannon, munitions of war, steel and iron, have thus far, however, been manufactured with success.

TRANSPORTATION AND COMMUNICATION. There are many roads throughout the well-settled parts of China, but they are in bad repair, and are almost impassable for wheeled vehicles. As has been seen above, the navigable rivers furnish many avenues of commerce, and these, with the numerous canals, carry a vast volume of trade. The railway question may be said to be the pivotal matter of Chinese economic and political life to-day. The immense extent of territory and the wretched condition of Chinese highroads combine to hinder commercial intercourse between the various parts of the country; indeed, to thwart all economic development. At the same time the backward state of the Chinese people in all matters requiring advanced industrial equipment, and a genius for and experience in financial organization and ability to handle undertakings on so large a scale as a national railway requires, throws the initiative on the foreign nations who are eagerly seeking Chinese trade. Hence, this subject of railroads has become in China a politico-diplomatic matter, each of the great powers endeavoring to secure concessions for what are expected to be the most profitable roads, as well as for such as may have an important strategic value should a partition of China or a conflict of foreign powers in her territory eventually take place. Railway building in China is in its infancy; but the lines of what will become main trunk roads have not only been mapped out, but actually surveyed, and all preliminary steps, such as securing Government concessions and financial backing, have been taken. Knowing already the resources and relative economic importance of the various sections of China, we may analyze the constructed and projected railways as controlled and planned by the various foreign nations. Thus far the total mileage of completed railways in China, with the exception of the Russian line to Port Arthur, does not exceed 1000 miles.

(1) *The Russian Sphere of Influence.*—In the extreme northeastern section of the empire (Manchuria) Russia has laid her line from Port Arthur, at the southern end of the Liao-tung Peninsula, running north through Mukden and farther on through Kirin and Bodune (Petuna)—a line of nearly 1000 miles, finally connecting with the Trans-Siberian Railway. A branch road connects this feeder of the trans-Siberian road with the rich port of Niu-chwang, near the eastern coast of the Liao-tung Gulf. This road, though of immense value to Chinese trade, especially the tea trade, is entirely in Russian hands, and is less subject to Chinese control than any other railroad in the country, although by a clause of doubtful value it is supposed to revert to the Chinese Government in eighty years. The road is not only of supreme strategic importance to Russia, but promises to become quite lucrative as well. Within the two years of 1896-98 its freight traffic more than trebled, increasing from 192,000 tons to 616,000, and the number of passengers increased almost fourfold—from 244,000 to 948,000. A concession for building a railway from Cheng-ting, in Pe-chi-li, to Tai-yuan, in Shan-si, with an eventual extension to Si-ngan-fu, the capital of Shen-si, has been secured by the Russo-Chinese Bank, and the work of construction delegated by the latter to a French syndicate. Si-ngan-fu is the terminal point of the caravan route, and Russia thereby secures for its railways the entire tea trade, as well as the still more important mineral and agricultural trade which is bound to spring up in that region as soon as the road is completed. Thus Russia has cut into the heart of the mining region of China, on which the English thought they had secured a firm hold through their mining concessions. Russia has, moreover, secured the privilege of connecting the port of Niu-chwang with Peking, should such a road be decided upon by the Chinese Government. In that case the Russian Government would be in a position, in the event of war, to pour its troops into the very capital of the Chinese Empire. But all of these lines are comparatively insignificant, or may be called mere feeders, compared with the great concession wrung by Russia from the Chinese in the teeth of the fiercest opposition on the part of Great Britain and Germany—viz. the great projected Chinese trunk line which is to traverse the entire length of China all the way from Peking in the north to Canton in the south. The road, when completed, is destined to bring into closest touch two interests which have hitherto stood far apart—namely, the Russian and American. The Peking-Canton railroad naturally falls apart into two distinct and almost equal divisions (north and south) of the Yang-tse-kiang. The northern section is to run from Peking to Hankow on the Yang-tse-kiang, a rich river port accessible to large ocean-going vessels, and, with the two neighboring towns of Han-yang and Wu-chang, having a population of about 1,500,000. This section was originally granted to a Chinese railway syndicate, which, owing to general incapacity and lack of native financial support, was constrained to seek foreign aid. A Belgian syndicate then secured the concession through the connivance of the French and Russian ministers and the Russo-Chinese Bank. This disposition of the concession was little relished by the English, first, because the railway will serve to connect the Russian and the French spheres of influence in the northeast and southwest respectively, and, second, because through its entire length of about 850 miles it will tap some of the richest of China's provinces, furnishing an outlet for the agricultural and mineral products which the English themselves largely control.

(2) *The American Concession.*—The concession for the southern section of the great trunk line connecting Hankow with Canton has been granted to an American syndicate known as the American China Development Company. The length of that line measures about a thousand miles, and though the territory through which it passes is not so rich as along the northern section, its two populous termini alone—viz. Hankow and Wu-chang on the one hand, with large iron and steel plants and other important manufactures, and Canton and Hong Kong on the other, with about an equal population, and constituting the most important and richest ports of China—insure a lucrative traffic. Moreover, a great part of the traffic of the northern section will require the Hankow-Canton line as an outlet for its southern points of destination, unless it takes the roundabout route of the Yang-tse-kiang and the Pacific Ocean.

(3) *The British Sphere of Influence.*—The Peking-Tien-tsin-Taku Railway, in the Province of Pe-chi-li, grew out of a little local railway built with the aid of British capital by Li Hung Chang from Tien-tsin to his mines. It was extended northwest to Peking, and northeast, through a rich coal district, to the port of Shan-hai-kwan, on the Manchurian border. Thence the road was extended along the Manchurian coast for 113 miles to Kin-chow, at the head of the Liao-tung Gulf. Another projected extension of 106 miles from Kin-chow to Sin-min-thun, only 40 miles distant from Mukden, will bring the road in contact with the Russian railway, requiring only a branch of that length to effect an actual junction. This extension of British lines in the semi-Russian territory of Manchuria is an offset to the Russian encroachments in the region of English mining concessions in the provinces of Shan-si and Shen-si mentioned above; and, owing to the great rivalry and jealousy between the two nations, cannot but serve as an additional element of friction. Indeed, some irritation occurred in 1899, and, in spite of an agreement reached between the two Governments, led to a new conflict during the Boxer troubles, when the road was seized by the Russians, by whom it was restored to the British only in February, 1900. The road described is managed and run almost exclusively by means of Chinese employés, and is extremely profitable. A more important and less disputed English concession is the road from Tien-tsin to Chin Kiang, below Nanking on the Yang-tse-kiang. It runs parallel to the ancient Imperial canal, which has fallen into disuse, as has everything else depending on Chinese officials for maintenance. This line will pass through a number of large

cities in the rich eastern coast region, and will be prolonged as far as Ning-po, in order to take in the rich ports of Nanking, Shanghai, and Hang-chow. As it will thus connect the capital of the empire with the south, it may, in conjunction with the Ho-ang-ho and Yang-tse-kiang, serve to compete with the other trunk line—the Russian-American Peking-Canton road mentioned above—for all purposes of foreign and coast trade. Like that other trunk road, the construction and exploitation of this railway is to be divided territorially between two nations—Germany and England—the northern section (passing through Shan-tung, which contains the Kiao-chau district) naturally falling to the Germans, and the southern to the English. As a compensation for the Russian Peking-Hankow concession, the English have been granted a concession for the construction of lines in the mining regions of Shan-si and Ho-nan. They will of course utilize this concession in connection with the extensive mining operations which they carry on in those provinces. These roads, however, will have to use the Russian-American trunk line as an outlet, except in so far as they shall be able to use the Ho-ang-ho and Yang-tse-kiang. A more far-reaching English project is the construction of a railway in southwestern China to connect the Yang-tse-kiang with the Indo-Burmese line. This line, if built, would practically bring about direct railway communication between China and India, and would afford travelers an all-rail route through China from Siberia to India. While not of great commercial importance, it would be extremely valuable to the British, for military reasons, to offset the French lines in that section of the territory, which, through the great Peking-Canton line, will be in easy communication with the Russians in the north.

(4) *The French Sphere of Influence.*—The chief railway interests of the French centre in the extreme south of China, directly west and southwest of Canton. There are to be lines from Hanoi, in Tongking, to Yun-nan, in the province of that name, and to Nan-ning, in Kwang-si, the latter point to be further connected with the Chinese treaty port of Pakhoi. These roads will be built chiefly at the expense of the French Government, which is interested in them for their military importance. In addition to these, French capital is invested in a number of the Russian lines, as indicated above.

(5) *German Concessions.*—In addition to the Tien-tsin-Ching-kiang line, in which, as already stated, the Germans are interested together with the English, the Germans have secured exclusive concessions in the entire Province of Shan-tung, where they are building a triangular line to connect Kiao-chau with Tsi-nan, on the Ho-ang-ho, in such manner as to inclose all the valuable mining region of Shan-tung. This line is intended to serve at the same time as an outlet for the mineral products of Shan-si and Ho-nan, and may be extended later so as to take in the entire region along the Ho-ang-ho, in which case the German sphere will serve as a 'buffer State' between the Russian and British territories.

In nearly all of these foreign concessions the Chinese Government not only reserves for itself the ultimate reversion of the railway lines and their equipment without any compensation, but also the lion's share of the profits. To reduce the opportunities for foreign interference to a minimum, provision is made for Chinese control in all cases. The foreign syndicate obtaining a concession is permitted only to construct and operate the road. The land on which the road is built, or has to be built, is purchased by a syndicate of Chinese subjects in whose hands is also vested the financial control of the road. Provision is made even for the ultimate native control of the operation of the road, as well, by requiring every foreign syndicate to maintain a school for the instruction of young Chinese in the sciences and arts pertaining to the business (railroad or mining as the case may be). The foreign syndicate receives 5 per cent. on the capital invested and one-fifth of the net profits, the remaining four-fifths being equally divided between the native syndicate and the Chinese Government. Thus the Government secures 40 per cent. of the net profits and the final reversion of the road, in addition to the privilege of transporting troops and ammunition at half rates.

The telegraph has been extended somewhat rapidly, the mileage of wire being 14,000 miles, with 250 offices, the lines constructed and operated mainly by the Chinese Government. The postal service, initiated by the Government in 1897, is operated by carts and runners. In 1902 there were more than 400 miles of railway in operation in China proper.

COMMERCE. The commercial relations of China with foreign countries are a matter of recent history. Although the Portuguese established a trading port in China as early as 1522, and trade was thenceforth carried on almost without interruption by them and the Dutch, the English, and the Americans, these secular relations lacked stability and safety, owing to the refusal of the Chinese Government to grant suitable protection, and to its avowed hostility to foreigners. Only since 1842, the year of the conclusion of the Treaty of Nanking, which followed the so-called Opium War with England, has commerce enjoyed the official sanction of the Chinese Government in specially designated ports. The number of these ports steadily increased as one or another European power succeeded in wringing concessions from China. As a rule such concessions have followed in the wake of active hostilities, and undoubtedly the troubles in China engendered by the Boxer uprising in 1900 are certain likewise to lead to an unprecedented expansion of Chinese commerce. Previous to the conclusion of the last international agreement the following ports were open to foreign commerce:

PLACE	Gross value of the trade	
	In 1899	In 1900
Nin-chwang	$36,267,000	$16,078,000
Tien-tsin	58,203,000	23,102,000
Chi-fu	20,551,000	19,732,000
Kiao-chau	1,613,000	2,887,000
Chung-king	13,344,000	17,851,000
J-chang	2,705,000	612,000
Sha-shi	161,000	402,000
Yo-chow	....	105,000
Hankow	49,057,000	41,647,000
Kiu-kiang	13,550,000	11,941,000
Wu-hu	14,806,000	13,199,000
Nanking	1,750,000	2,824,000
Chingkiang	18,755,000	1,321,000
Shanghai	90,962,000	71,242,000
Su-chow	1,058,000	856,000
Ning-po	11,872,000	11,116,000

PLACE	Gross value of the trade	
	In 1899	In 1900
Hang-chow	$8,396,000	$6,887,000
Wen-chow	1,186,000	1,066,000
San-tu-ao	19,000	479,000
Fu-chow	12,767,000	11,200,000
Amoy	12,184,000	10,178,000
Swatow	32,961,000	31,569,000
Wu-chow	4,470,000	4,764,000
San-shui	2,166,000	1,667,000
Canton	42,809,000	38,256,000
Kow-lun	41,268,000	34,367,000
Lappa	10,037,000	9,908,000
Kiung-chow	3,393,000	2,140,000
Pakhoi	3,024,000	2,829,000
Lung-chow	63,000	97,000
Meng-tsze	3,838,000	3,943,000
Sze-mao	156,000	136,000

There are to be added to these: Yatung (Tibet), rupees 1,785,397; and Kongmun and Kumchuk, for which there are no available data. The most important of the above list is Shanghai. The growth of China's foreign trade since the opening of the above treaty ports may be seen from the following table:

YEAR	Imports	Exports
1845	$10,277,000	$19,098,000
1875	50,496,000	51,484,000
1885	64,586,000	44,254,000
1890	94,778,000	65,358,000
1895	125,338,000	107,470,000
1896	147,891,000	98,314,000
1897	148,065,000	....
1898	152,993,000	122,626,000
1899	193,266,000	146,838,000
1900	154,081,000	119,246,000

These figures show the unexampled increase in the trade of China in the year preceding the Boxer uprising, when both the imports and exports more than doubled in value as compared with 1890. This enormous increase was due to railways which had opened up hitherto inaccessible parts of the country to the world's trade. As the statistical secretary of the Maritime Customs of China remarks, there is no reason why these figures should not treble within a short time—as soon as railway facilities shall enable the Chinese producer to dispose of his surplus products to the foreign trader. He cannot do this at present, owing to the extremely high cost of transportation. To quote from the official report: "To form an idea of what future prospects are, it is fair to make a comparison with India. The areas of the two empires are almost identical and their products very similar. But China has a larger, a more industrious, and more intelligent population; while, on the whole, the country is probably more fertile and possesses greater mineral resources. In the former country trade is assisted by good roads, railways, and lightness or absence of taxation: in the latter, at present, it is hampered by directly opposite conditions. The result is that the exports from India are worth three times the exports from China. With equal opportunities, which the building of railways and opening of mines will bring about, the discrepancy should disappear."

As may be gathered from the following table of the export and import trade with the leading countries in 1899, the three closest rivals for the growing trade of China in the order of their importance are Great Britain, Japan, and the United States. The value of the latter's trade in 1899 was only about three million dollars below that of all Continental Europe except Russia, and the trade of Russia was only about one-half that of the United States. The figures are in haikwan taels (tael=73 cents gold).

COUNTRIES	Imports from	Exports to	Total Trade with
Great Britain	40,161,115	13,962,547	54,123,662
Hong Kong (mostly British products)	118,096,208	71,845,558	189,941,766
Japan	35,896,745	17,251,144	53,147,889
Continent of Europe (except Russia)	10,172,398	36,763,506	46,935,904
United States	22,288,745	21,685,715	43,974,460
India	31,911,214	1,731,498	33,642,712
Russia	3,522,404	18,556,992	22,079,396

Among the imports, cotton goods occupy the foremost place, their value in 1899, hk. tls. 104,000,000, constituting nearly 40 per cent. of all the imports. According to official reports, American and Japanese goods are in greatest demand and are forcing the products of other nations out of the Chinese market. In cotton yarn the Japanese lead. The next largest item among imports is represented by 'sundries,' including all kinds of articles of personal use designed chiefly for comfort or luxury, such as candles, cigars, clocks and watches, lamps, perfumery, umbrellas, and soap. The value of these in 1899 had risen to nearly 112,000,000 taels, as compared with less than 90,000,000 in 1898. The same ratio is true of opium, which formed in value about one-eighth of all the imports, in spite of its enormous production in China. While the imports thus evidence an increased call for articles of personal use, the demand for raw materials, especially metals, seems as yet to be stationary, and amounts to less than 10,000,000 taels per year, or about 3½ per cent. of all the imports. It is this item, however, which is destined to increase most with the industrial awakening of the country.

The chief articles of export are all kinds of raw silk and silk products, whose value, exceeding 82,000,000 taels in 1899, constituted more than 40 per cent. of all the exports. Next in importance is tea, followed by other agricultural products. Chinaware, bamboo-ware, and other articles of manufacture comprise but an insignificant part of the exports. In addition to the foreign trade there is a large coasting trade which far exceeds the former, as may be seen from the figures of shipping given below. As for the inland trade, it must be exceedingly important, owing to the variety of products of the several provinces of China, and to its vast population; but there are no statistics available on this subject. The relation of the foreign to the coasting trade is seen from the following totals of shipping. In 1899 the foreign ports were represented by 7000 vessels aggregating 5,479,000 tons, whereas the coastwise entries comprised 25,300 vessels of 14,147,000 tons. "The total tonnage," says the official report, "of entries and clearances was 39,268,000 tons; and of this total Great Britain contributed 59 per cent.; China 24 per cent.; Japan 7 per cent.; Germany 5 per cent.; France 2 per cent.; Sweden and Norway 1 per cent.; Russia 1 per cent.; and America 1 per cent." It is clear from the above that China controls much of her own shipping, namely, about one-third of the total coasting tonnage and one-fourth of the foreign trade tonnage. Moreover, the Chinese shipping is increasing at the expense of the foreign shipping, as shown by the following table of vessels entered and cleared, 1894-1899:

YEAR	Total Shipping		Chinese Shipping	
	No.	Tons	No.	Tons
1894	38,063	29,622,001	13,126	5,539,246
1895	37,132	29,737,078	13,014	5,220,121
1896	40,495	33,490.857	15,969	7,251,292
1897	44.500	33,752,362	18,889	7,819,980
1898	52,661	34,233,580	23,547	8,187,472
1899	65,418	39,268,330	31,009	9,349,247

These tables of Chinese shipping do not embrace the shipping of the ports of Kow-lun, Lappa, Meng-tsze. Lung-chow, Chung-king, Su-chow, Hang-chow, and Kiao-chau. Leaving these out of consideration, the above figures show that while, in the period of 1894-99, the total tonnage had increased less than 33 per cent., the gain in Chinese tonnage was more than 68 per cent.

GOVERNMENT. China is not an empire in the Occidental sense of the term, nor is there a central Government as there is a German, a Russian, and a British Government, with respective centres of authority in Berlin, Saint Petersburg, and London. The Chinese are held together not by political force, but by a religious, social, and educational system. The general constitution of China proper is that of a confederation of homogeneous provinces. The Manchu power, that is the clan of conquerors numbering 6.000.000 who govern the empire, is simply a regulating machine. In official documents the ancient and purely territorial names of provinces (significant of entities not safe to interfere with) are used as often as are their modern geographical names, very much as though New England, New Netherlands, and New Spain still existed as realities in America. As a matter of fact, the Emperor rules in the empire, the Governors in the provinces, and the Magistrates in the districts. If these do not rule according to general custom and acknowledged principles, rebellion soon empties the throne or the seat of the official. Each provincial Governor reports on all formal matters to the boards of Civil Appointments, Revenue, Rites, War and Navy, Public Works, and Justice in Peking. Superior to these boards in theory, as a sort of supreme court, is the censorate, or office of general inspection, whose members act as checks on the ministers and who can at any time send petitions or remonstrances to the sovereign, criticising any official.

In matters that are out of the usual routine, a provincial Governor can petition the Emperor directly. Between the Emperor and provincial Governors is the Viceroy. This peculiar office, like that of High Commissioner, gives scope to men of special abilities, and this explains the fact that in recent years foreigners have been familiar with the names only of two or three prominent Viceroys. The viceroyalties consist of two or three provinces, and there are thus ten or twelve Viceroys or Governors-General, who may work together with or independently of the provincial Governors. Usually the Governor and the Viceroy are the sole mediums of communication between the capital and province, though the provincial treasurer and the provincial judge are powerful assistants or checks, as the case may be. Thus these four functionaries form the executive, consultative, and, in a measure, even the judicial and legislative bodies—in a word, 'the government' of each province—and may be said to represent the nation, which makes up the federation known as the Chinese Empire.

Each province has its army and navy, and in time of war may be utterly uninterested and take no part in what is going on in a distant part of the empire. The highest viceroyalty is that of the two Kiangs, with its seat at Nanking; the second is that of Pe-chi-li, with its seat at Peking, the national capital: the third viceroyalty is that of the two Kwangs, with its headquarters at Canton, the other important capitals being at Fu-chow, Hang-chow, Wu-chang, Chang-sha, Yun-nan, and Ku-yang. The provinces of Shan-tung, Shan-si, and Ho-nan, the oldest parts of China, have no Viceroy, while Sze-Chuen has no Governor, but only a Viceroy. Thus each of the eighteen provinces, with its own army, navy, system of taxation, and its own social customs, is a complete State in itself, whose corporate existence is in no way dependent upon any other State. Only in the regulation of the salt trade, the management of the navy, and occasional 'imperial' appropriations are they under imperial control. In late years the pressure of foreign complications has created two viceregal High Commissioners, with tacit diplomatic powers over other Viceroys and Governors. The Peking Government makes no new laws, leaves each province to its own devices, and is rather of the nature of a general staff of an army, which absorbs into itself and gives out, when necessity calls, able men for the administration of affairs.

Each province is thus a State in itself and bases its administrative system upon the real official unit of Chinese corporate life, the *hien*, or city district. Of these there are 1300 in the empire. Each province has from 70 to 100 or more *hien*, a term which Europeans translate 'district,' 'department,' 'canton,' or 'prefecture.' Thus the half-barbarian Kwei-chow has but 34 *hien*, with numerous districts in which dwell half-civilized natives, while Pe-chi-li has 140 *hien*, the total including the Peking and Mongol districts. The *hien* always consists, in pure Chinese tracts, of a walled city and an area of 500 or 1000 square miles around the town. The *hien* magistrate is the heart and soul of all official life. The people call him 'father and mother officer,' for he has, or may have, relations direct with the Emperor and is always close to the masses. Usually entering office with literary or scholastic qualifications only, he is assisted by a permanent staff of trained specialists. He must keep also from 30 to 300 runners, collectors, lictors, and policemen for the administration of justice.

Every group of two or more *hien* is under a *fu*, or city of the first class, and each province has from five to ten *fu*. The ancient customs and privileges of each province, district, and city are still potent in practical politics and make it utterly impossible to give a uniform description of the system of administration, for in reality this federation of States and cities is more like the mediæval Germany than like the modern centralized German Empire. The empire is studded with villages and hamlets, and, as in European nomenclature, many popular names for places are words denoting shop, temple, nunnery, rapids, schools, inn, fair, market, bend, etc. The various Chinese districts less than provinces may be likened to the capital, cathedral town, State capital, municipality of the first rank, municipality of the second rank, abbey town, and borough of Europe, differing greatly in territory and population, however, and also in relative historical or commercial importance. But, on the whole, China is an empire of villages, three-fourths of the people dwelling in these. Relatively to the whole population, there are fewer large cities in China than in Western lands.

The various grades of officers are distinguished by the color and material of the tiny knob surmounting the cap. The only permanent nobility consists of the descendants of Confucius. In the imperial or Manchu class there are nine orders of nobility, but with every generation the holder of title declines in dignity until he reaches the common people. There are also five ancient orders open to the civil and military servants of the State. The existing Chinese system of conferring patents of nobility and honorary titles has descended from the feudal States of the Sixth Century B.C.

The government of China, then, is a harmonious blending of local liberty with centralized authority. The general maxim of politics is to rule the nation by moral agency rather than by physical force, relying on education more than on arms, keeping the line of promotion open to the wisest and ablest men, who may come from any social level or position in life. Thus China is a great democracy, and the Chinese in a way one of the freest people in Asia. Even an aboriginal savage may become a Viceroy. Though in theory the Emperor is the Son of Heaven, if he does not reign wisely, or is wicked, or indolent, the people may depose him, and if their rebellion succeeds it is because Heaven has willed it so.

Chinese law is the growth of many centuries, and is based on immemorial custom. Though voluminous and complex, it is regulated by the fundamental principle of parental authority, which has been the great conserving force and unifying power throughout the ages. Traditionally referred in their origin to the sovereigns Yao and Shun (B.C. 2357-2208), the laws have been repromulgated in modified forms with every change of dynasty, until, with all their faults, they are admirably adapted to the requirements of China's teeming population of peace-loving subjects. The laws are divided into *lut* and *lai*, that is, fundamental and supplemental, the former permanent, the latter liable to revision every few years. They may be classified as general, civil, fiscal, military, criminal, and those relating to public works. The criminal code is remarkable for the conciseness and simplicity of its language, yet the actual punishment inflicted depends very much upon the judge. Torture is used to extract testimony. Theoretically no one is condemned until he has confessed his crime, though often, doubtless, the innocent will confess to any charge to escape torture and die quickly; for as a rule the Chinese prefer death to long confinement, and capital punishment follows quickly after sentence. The punishments inflicted are flogging with the bamboo, banishment, and death by strangling or decapitation. Manacles of wood, iron fetters, the *cangue* or portable pillory, and not a few other instruments of torture are in use. Lawyers, in the Western sense of the term, are unknown, and those aiding prisoners form a disreputable class not allowed in court. Oaths are taken on a cock's head chopped from its body. In theory the accused is already guilty, and a Chinese judge, like the French, acts as prosecutor as well as arbiter. In spite of the prevalence of bribery, judges are apt to give common-sense decisions.

ARMY AND NAVY. No one knows the real strength of the Chinese army, not even the Chinese Government itself, for there is no such thing as a national army. The Manchu and Chinese soldiers are in different divisions, the former supposed to number 170,000, quartered in most of the large cities under command of Manchu generals, each soldier receiving his rice and three taels a month. The provincial armies, with the exception of the Manchu garrisons, are maintained at the expense of the Viceroys. Official figures are utterly deceptive, for the commanding officers receive only nominal salaries and 'save the face' of things at an inspection, by hiring men temporarily. Officially there are the army under the Eight Banners and the Ying Ping or national army, which on paper numbers over a million men. One may divide the available forces into the active army, including the army of Manchuria, the army of the centre, the army of Turkestan, and, as a reserve force, the territorial army, which is supposed to number in war 600,000 men. While modern rifles and cannon have been made in China, or imported in great abundance, the bow and arrow are still in use. Lord Beresford, in 1898, inspected fourteen different 'armies,' and counted as many different kinds of rifles, finding only one army complete in detail according to Western ideas, most of the others being in the rudimentary stages of organization and without transport or medical service. Yet all testimony seems to show that the Chinese need but good training, equipment, and leadership to make excellent soldiers or sailors.

The Chinese navy is divided into two squadrons, the Pei-yang and the Nan-Yang, or North and South. The former consists of three cruisers of 3400 tons, German built, and two torpedo boats; the other vessels, cruisers and torpedo destroyers, ordered in Europe, being unpaid for. The southern squadron consists of six cruisers of 3500 tons, one cruiser of smaller tonnage, four old-fashioned gunboats of 400 tons, and four torpedo-boats, all built in Europe.

At least forty forts and batteries, some of them immensely powerful, have been built and armed with modern high-power guns from Europe, and the artillerists are men of fine physical appearance. There are also seven arsenals in the empire, at Tien-tsin, Shanghai, Nanking, Hang-kow, Fu-chow, Canton, and Cheng-tu, the one at Shanghai, where there is also a naval school, being finely equipped.

POPULATION. Beyond rough estimates made for purposes of taxation and tributes, no official census of China has yet been taken, and anything like an official enumeration of the empire is unknown. Considerations of revenue make the counting rather of the nature of an assessment, for young children and aged men were not included. War, rebellion, famine, and flood have produced great fluctuations in the population. The Tai-ping Rebellion reduced the registration by two-fifths. It may be stated that 400,000,000 in round numbers approximates the truth, although some authorities are not willing to con-cede so large a figure. It is certain that while the fertile plain region is over-populated, two-thirds of the empire, and even of China proper, could maintain a much greater population. In 1894 the population of China proper, according to E. H. Parker, one of the ablest economic students of the Chinese, was 421,800,000; Sze-chuen, the most populous province, having 79,-500,000 inhabitants, and Kwei-chow, the least populous, 4,800,000. The population of Great Britain and Bengal probably exceeds in density that of the average population of China, though no European State except Belgium can reach the average of the eastern Chinese provinces. If the Chinese should develop their energies by the introduction of scientific farming, mining, engineering, and railways, China proper could easily double its population without endangering its food-supply. The following is a list of provinces, with the meanings of their appellations:

PROVINCES	Meaning of name
Pe-chi-li	Direct Rule
Shan-tung	Mountain East
Shan-si	Mountain West
Ho-nan	River South
Kiang-su	River Su
Ngan-hwei	Peace Glory
Kiang-si	River West
Che-kiang	Che River
Fu-kien	Happiness Established
Hu-peh	Lake North
Hu-nan	Lake South
Shen-si	Shen West
Kan-su	Sweet—Sedate
Sze-chuen	Four Streams
Kwang-tung	Broad East
Kwang-si	Broad West
Kwei-chow	Noble Tract
Yun-nan	Cloudy South

The population of the Chinese Empire has generally been greatly overestimated. Recent careful estimates give a total of 399,680,000, assigning to China proper 383,000,000. The Chinese abroad are found in every civilized and uncivilized country—there being in the Americas, including Hawaii, about 140,000; in the Dutch, British, and American East Indies and French Indo-China, between 5,000,000 and 7,000,000, with many also in Australia, Japan, and Korea. In 1900 there were 16,811 foreigners resident in the treaty ports of China, of whom 3471 were British, 2900 Japanese, 1908 Americans, 1941 Russians, 1175 Portuguese, 1054 French, and 1343 Germans.

ETHNOLOGY. In common parlance the term Chinese is applied indiscriminately to the general population of the Chinese Empire. By some ethnologists 'Sinitic' ('Chinese') is used in the sense in which others employ 'Tibeto-Chinese,' 'Tibeto-Indo-Chinese,' etc., to designate that great branch of the Mongolian or yellow race which has peopled China, Tibet, and Farther India, and of which the Chinese proper are the oldest, most cultured, most numerous, and most important representatives. The Chinese proper, with whom thousands of years of civilization and the possession of common signs for a written language have masked to a considerable extent somatic and linguistic diversities, are the result of a fusion of peoples, few of whom were far removed from one another in speech or in blood, though in the process of conquering the vast territory which they now control, they have received the blood of a number of more primitive races, not all of whom are with certainty to be credited to the Mongolian stock. Their earliest home seems to have been in the region to the north of the present Province of Kan-su, and extending to the Altai, where, about B.C. 5000, they had, as a more or less agricultural people, developed the elements of their racial culture. About B.C. 3000 (stimulated, perhaps, by the pressure of Aryan tribes on the southwest, and more primitive hordes on the northwest), they began the descent of the great river-valleys of the Ho-ang-ho and Yang-tse-kiang and their tributaries to the shores of the Pacific. This progress was slow, as the 'savages' (the original inhabitants) were very numerous, but by B.C. 1000-700 the greater part of the work was done, the pre-Chinese aborigines between the Pei-ho and the Yang-tse-kiang having been exterminated, assimilated, or driven into the mountains of the west and south, where they still survive. While this expansion was going on, the northwest and north of the empire were invaded by a succession of barbaric Sibiric tribes, from which quarter came also the Mongol conquerors of the Chinese in the Thirteenth Century of our era, and the Manchu dynasty that since 1644 has reigned over the people.

In general the Chinese present the characteristic features of the Mongolian race, its yellowish skin, lank, coarse black hair, almost rudimentary beard and whiskers, scanty growth of hair on the rest of the body, prominent cheek-bones, black eyes lacking somewhat in lustre and expression and sloping obliquely toward the nose, which is broad-nostriled with little or no bridge, round face, small hands and feet, long and tapering fingers. The features are square, angular, and flattened, the cheek-bones high, the ears usually large and standing out from the head, the chin usually small, the neck short and thickset, and the expression of the face monotonously uniform, although familiarity with the type shows that amid a general uniformity there are many points of difference. The average height is 5 feet 4 inches. The cranial capacity is from 1200 to 1300 cubic centimeters, or about 100 cubic centimeters below the Caucasian average. (For illustration, see Colored Plate of YELLOW RACES OF ASIA.) Closer study tends to show that among the Chinese proper three physical types may perhaps be distinguished: (1) A northern, taller, lighter-skinned, less brachycephalic group. Baelz (1901) considers this type to be 'Manchu-Korean' in origin, in part at least, with perhaps proto-Aryan admixture. (2) A central group, which Deniker (1900) thinks has preserved best the original Chinese type. (3) A southern, shorter, darker-skinned, partly brachycephalic and partly mesocephalic type, presenting generally an approximation to the physical type of southern Mongolia, according to Deniker, with many suggestions of Malayan admixture. In the opinion of Baelz, the Mongol type prevails in central and southern China, while in the extreme south Malayan influences are very perceptible. Underlying all the non-Chinese admixtures Baelz believes there is an element derived from a quasi-Caucasian race (the Aino of Japan, etc., are perhaps a distant offshoot), once widespread over northeastern Asia, and split in two by the advancing Mongol-Tartar tribes, but this theory needs proof. Zaborowski (1900) holds that the Hakkas (immigrants from northern China into the extreme south), a dolichocephalic Mongolian type, which he considers related to the long-headed element found among the Tunguses and in the tumuli of the Trans-Baïkal country, are the real representatives of the ancient Chinese proper. Of the more or less 'aboriginal' and non-Chinese people of China the following may be mentioned: the Miao-tse in the eastern parts of Kwei-chow, the south of Hu-nan, northern Kwang-si, and northwestern Kwang-tung; the Lolos (or Nésus) of western Sze-chuen and northeastern Yun-nan; the Tu-jen, Meo, Yao, etc., of Kwang-si; the Shans and other Thaï tribes of the Burmese-Chinese frontier, who belong more or less remotely to the same stock as the Burmese, Siamese, etc. Of these aboriginal peoples the most important are the Miao-tse, looked upon by many authorities as representing the earlier population of a great part of China and as having a 'sub-Caucasian' strain of blood, but considered by others as allied to the Tibetan type. The Lolos appear, by speech at least, to be closer to the Thaï peoples of Farther India. All through the south and west of China the intermingling of peoples has taken place, sometimes on a large scale. The 'savages' have not been so nearly exterminated or driven out as some believe.

In temperament the Chinese are usually taciturn, often morose, lethargic, or fitfully vehement. The most marked mental peculiarity in the Chinaman is the wonderful development of the faculty of memory, without a corresponding exercise of the faculty of judgment. Books are frequently learned by heart and repeated from beginning to end without mistake. The Chinese are persevering and industrious, patient, peaceable, and polite. Their dread of giving offence makes them seem to the foreigner deceitful, often when they are least so. Credulity and sympathy are marked characteristics. As to their morals and religion, the judgments of foreigners are worth very little, for these differ greatly and are so tinged with the personality of the observer that fair conclusions are impossible. With little fear of death, though they politely avoid the subject in conversation or make use of euphemisms, the Chinese resort readily to suicide when in difficulties. In the stolidity with which they undergo torture they resemble the North American Indians. As a rule they look with contempt upon arms and war, and have always cultivated the arts which maintain peace and harmonious human intercourse, so that for ages China has been practically without an army and without a police force. In one respect China is the freest country in Asia; local self-government has been carried to a very high degree, insuring both personal freedom and excellence in civil organization. The Chinese are lacking, however, in military or naval discipline, and are apt to lose self-control and yield to panic in times of sudden danger. In the main they are temperate, practical to the last degree, unimaginative, imbued with a mercantile spirit, yet literary. Though there are manifold varieties of character and disposition, the inhabitants of China proper are practically one people, notwithstanding that differences in dialect are so great as to make it nearly impossible for the uneducated of distant provinces to understand one another.

The essence of the Chinese social system, which has survived all political changes, assimilating all new elements, and absorbing China's conquerors, is the worship of ancestors, the word worship being taken in the old English sense of honor. Filial piety is the first of all virtues. All Chinese worship at the tombs of their parents. In the houses of the well-to-do, one room, the domestic sanctuary, is set apart for the tablets inscribed with the names of deceased relatives and ancestors, before which ceremonies, regulated by the classic Book of Rites, are performed. Indeed, China is ruled more from the cemetery than from the Emperor's palace, the care of the dead being often apparently a more important duty than the sustenance of the living. It is always the past that is the Golden Age, and reverence for a man or thing is in proportion to age. Much thought is given to the location of graves and cemeteries, this matter, like a myriad of others, being regulated by the *feng-shui* (literally, wind and water), a most elaborate system of superstition which contains the germs of a rude natural science. To be buried properly is the ambition of every Chinaman; the possession of a handsome coffin is often the most desirable of assets, and frequently this article is a most acceptable present to elders or relatives. The dead are honored by banquets, and in the crises of life ancestors are appealed to for help and direction. In ancient times human sacrifices were made at the graves of the dead. The firecrackers, which are set off in such great numbers at the burial of the dead or in visits to cemeteries, are but substitutes for the figures of men; in the course of time the powder-charged paper has taken the place of the human sacrifice. At the present time these pyrotechnics are supposed to drive away the foul spirits which love to lurk about the haunts of men, and with which the Chinese imagination overpopulates heaven, earth, and air.

Next to death, marriage is the most important event, and is universal, bachelors and old maids in health and mature life being quite unknown. Yet in social life there is a strict separation of the sexes, and the preliminaries of marriage are taken in charge by parents or professional matchmakers called the go-betweens. Often the future bride and groom do not see each other until the woman raises her cap from her covered eyes on the wedding day. Minute regulations direct every step in this and in all other social ceremonies, so that at all times and circumstances the Chinaman knows just what to do, and even in a house knows just where and when to sit down or to stand up. Polygamy is not legal or general, but if the wife proves barren the husband is very apt to take a concubine, for the order of Chinese society requires heirs, and especially sons, to keep up the ancestral sacrifices. The parents have full power over their children, but the duty of administering chastisement is usually left to the wife. Though in times of generous food-supply child-murder is but little practiced, yet millions of young children die every year; for a sick child when unresponsive to remedies is suspected to be non-human and must pass through an ordeal of neglect, cold, or starvation. If it dies the inference is that it was not human, but either of demoniac origin or else possessed. If it lives, it is human. The Chinese are thus continually under the influence of superstition, which not infrequently bursts out into great disorders, as in the Boxer uprising. In all their intercourse, especially among the higher classes, a tedious and laborious etiquette rules all actions, the Chinese being the slaves of precedent, a circumstance which accounts in part for that lack of mental initiative which is the curse of the nation. Chinese manners were regulated by the code in the Li-King or Book of Rites, 3000 years ago, and anything that savors of innovation is hooted down as impiety, if not treason. At Peking a department of the Government, the Board of Rites, has charge of the interpretation of the Li-King and the direction of ceremonies. The Chinese are therefore prone to think that most Occidentals, though good mechanics, perhaps, are destitute of politeness and morals.

The daily food of the Chinese is for the most part rice with a morsel of pork or poultry, though millet is much used by the poor in the north. In their cookery, which in the main is wholesome, are some peculiar delicacies, such as soup made from a glutinous substance that is found in birds' nests, sharks' fins, deer-sinews, and ducks' tongues. Their drink is brewed from rice and is a kind of beer, though distilled liquors from the same grain are very strong. The samshu of southern China and the whisky of Manchuria, with the unextracted fusel oil, make mischievous drunkards. Usually, however, liquor is drunk hot out of tiny cups at mealtime, and tea before or after meals only, in cups that have no saucer or handle, but a cover which holds the 'draw.' Out of this cover, the Europeans, on introducing tea, made a saucer, adding a handle to the cup. Many festivals and holy days, local, religious, and national, are celebrated, but the greatest of all is New Year's Day, before which debts are paid and new clothing is bought. Congratulations and festivities prevail, for this is every one's birthday, all dating their ages from this day. Though a child be born twenty-four hours before New Year's Day, it is considered to be in its second year. The Festival of the First Full Moon, the Feast of Lanterns, and the Festival of the Dragon Boat, are the other famous holidays. The streets on such occasions are full of music and gaiety, and night is turned into day by myriads of lanterns made of paper and gorgeous with painted scenes in many hues. The Chinaman is usually afraid of losing his dignity by active effort, and outdoor sports are not as yet in vogue, unless some utilitarian object is in view, kite-flying and shuttlecock being the most violent in which adults engage; but cards and dominoes, the theatre, gossiping and visiting, story-telling, peep-shows and entertainments given by itinerant showmen are very common and much enjoyed. There are hundreds of children's games and sports. Thousands of traveling performers, acrobats, wonder-workers, marionette-players, and purveyors of amusements of every sort, including movable refreshment stands and bake-shops, gain a living by amusing the little folks. Nonsense rhymes and comic doggerel for children are chanted by nurses and parents, though for the most part these are as unknown to foreigners as of old the Arabian Nights' Entertainments were to the closet students of Arabic. The Chinese do not shake hands, and kissing is unknown among them, but prostrations, salutations, and congratulations are very frequent.

From the standpoint of common sense, the Chinese dress is one of the best in the world, varying in material and thickness according to the season; the state of temperature usually takes its name and quality from the number of garments put on. One prominent idea in the theory of Chinese dress is to conceal or minimize the visible distinctions of sex, and only in their head-dress and footgear are the women noticeably different in appearance from the men. A loose jacket fitting closely around the neck, and short wide trousers, are the principal garments. Shoes are made of silk or cotton, with thick felt soles, but the upper classes wear boots of satin, into which they thrust their fans or pipes. The mourning color is white. Until their conquest by the Manchus, the Chinese wore their hair like the Koreans, gathered in a knot at the top, and only after much bloodshed were the conquerors able to compel the Chinese to adopt the symbol of subordination and loyalty. Now 200,000,000 males shave the front part of their heads and braid their hair in a long queue. This fashion gives employment to multitudes of barbers, for it is rarely that even a poor man attends to his own hair-dressing. For months after the death of an emperor, an event which allows no one to shave for a hundred days, the barbers have difficulty in earning a living. Hot water is preferred both for drinking and washing. After meals the face is wiped with a damp hot cloth. It is thought dangerous in itself to put cold water in the stomach, as it certainly is where drainage is so little attended to. Water to be drunk is first boiled. Unlike the Manchu women, Chinese girls, especially among the upper classes, have their feet bound in early childhood. After the torture of years is over, the lady with 'lilies' totters about as best she can, rarely going out of the house, and hearing of the outside world through servants and visitors, her circle of friends contracting rather than enlarging as life goes on.

For Art in China, see CHINESE ART.

RELIGION. There are five religions in China that are well established. These are the Confucian, Buddhist, Taoist, Mohammedan, and Christian; each of them a 'book' religion, and, excepting Taoism, with an historical founder. The religion of the ancient Chinese consisted of the double worship of God and of ancestors. Confucius gathered up and gave literary form to the national traditions. In doing this he so edited the ancient documents as to throw into shadow the spiritual and to lay emphasis upon the material side of life. By forbidding ambition he cut the tap-root of progress and produced a stagnant civilization. His system is still the basis of Chinese society and government. It is less a religion than a philosophy and practical code, having reference simply to this life, and making good citizens and neighbors rather than developing the possibilities of mankind. On its philosophical side, Confucianism has gone through many changes, until it has become the creed and the substitute for religion with the lettered classes. (See CHU-HI.) Though his tablet is saluted, and sacrifices of oxen and sheep are made before it at the equinoxes, it is hardly accurate to say that Confucius is worshiped.

Lao-tse (q.v.)—or, to Latinize it, Laocius—a contemporary of Confucius, though older than he, was more of a true philosopher or inquirer into the causes of things. He taught the doctrine of Tao. His remarkable treatise, the

Tao Teh King (*tao* means reason), contains neither superstition nor religion, but a system of rationalism. A vast, intangible, impersonal first principle is regarded there as the parent of all things, and man must attempt to realize this principle by escaping from all mental distraction. Lao-tse's speculations paved the way for Buddhism. In its subsequent development, or degradation, it has become little more than a fantastic system of spirit-worship, of which alchemy, incantation, and intercourse with the dead are the chief characteristics. As a religion it is not as ancient as Buddhism, and there is little or no connection between Lao-tse's teachings and the Taoism of to-day.

Buddhism entered China shortly after the opening of the Christian era, and in its development has taken the Northern, or expanded form, with its paradise, goddess of mercy, scriptures, voluminous and imposing ritual, passionate rhetoric, and a thousand stimulating influences which satisfied a mental craving not provided for in the simple materialism of Confucius. Besides monasteries and images, the Buddhist temples are found all over China, but in decay. The priests are illiterate, and despised by the educated. The monks and nuns are usually beggars, the former recognizable by their yellow robe. Only in a few places can Buddhism be said to be vigorous. The language of the sacred canon is Sanskrit, now known to few in China.

Mohammedanism was introduced directly from Arabia, and, as is believed, by the maternal uncle of Mohammed. Arriving in caravans from central Asia, or in ships by sea, the missionaries preached the faith industriously, and there are now about 20,000,000 Moslems in the empire. They have obtained State recognition. The three provinces Yun-nan, Kan-su, and Shen-si contain nine-tenths of these believers in one God, there being 10,000,000 north of the Yang-tse-kiang and 200,000 in Peking. Mosques are numerous, each containing a tablet in gold letters and reading "May the Emperor live ten thousand years." There is a large native literature on the subject of the faith of Islam in China.

The progress of Christianity has been slow. A tablet found in 1626, at Changan, Shen-si, indicates that the Nestorians introduced Christianity into China early in the Sixth Century. The Jesuits Ruggiaro and Ricci went to China in 1579 and 1581. Protestant missions were led by Robert Morrison in 1807. The latest estimates attribute to the Roman Catholics somewhat more than a million adherents, and to the Protestants about 100,000. Most of the men in the reform party have been pupils of the missionaries.

Confucianism has enjoyed State patronage and protection for about 2100 years. There have been severe struggles among the various adherents of 'the three religions' for supremacy; but the Chinese mind, indifferent to things abstract, is in its way tolerant, and there is outward peace. Millions of natives, scarcely knowing 'the three religions' as separate, accept them in a mechanical unity, each meeting a different want in human nature. Confucianism supplies the need of a moral code, Taoism ministers to the superstitious mind, and Buddhism, with its metaphysics and vague aspirations, appeals to the mystic element in man. There is also a State ritual, with the Temple of Heaven in Peking, at which sacrifices of the first class, to heaven and earth, are made, the Emperor acting for his people; but he does not minister as a priest, nor is there any such thing as a priesthood in China. The second class of offerings is to the sun, moon, gods of the land, spirits, and sages, and the third class to deceased statesmen and scholars. On a smaller scale, these ritual ceremonies are observed by the magistrates; for, above all, the Chinaman in every rank is a pantheist. Practically the Chinese are religiously inclined, having deep veneration for the idea of a soul and of immortality. Hence their great respect for the dead, love of funeral ceremonies, readiness to spend money over graves, desire to propitiate the ghosts of ancestors, yearning for sons, the strong family sentiment of unity, and the strict subordination of the younger to the elder. They are tolerant and non-militant. Except that there is no day of rest, and that the idea of 'praise' never entered the Chinaman's mind, a good man in China is, in natural religion, very much what a good man is in Christendom. In faith, doctrine, and dogma, it is very different, for the average Chinaman is uninterested in metaphysics. In the propagation of religion by foreigners, true and simple Christianity exercises a lasting effect for good on the Chinese mind. Most of the so-called 'religious' troubles come from the clashing of militant alien doctrine with the village customs and social habits so dear to the rustic mind. Toward the questions of liquor, slavery, and concubinage, and in social customs generally, the entire mental attitudes of European and native differ.

EDUCATION. Differing as the Chinese people do so greatly in local peculiarities, their system of education has made them a nation, binding together the distant parts of the empire and holding them in close unity during the various conquests which they have undergone. Their system of education has been their chief defense, for by it they have conquered their conquerors and made them like themselves. Education means less personal development than the means of obtaining office, and consequently it is sought eagerly by all classes. The system of appointment to office by competitive literary examination has existed for nearly seventeen centuries; but as only a small fraction of aspirants can enter even the lower grades of salaried office, there exists necessarily a body of many millions of so-called literati. In China proper not more than 6 per cent. of the men and 2 per cent. of the women can read an ordinary book, although traders and mechanics may be able to write fluently the characters needed for ordinary letters and bookkeeping, using especially those which describe the articles used in their business, the technical terms, etc. The literary men, rejected in the examinations, are found all over the empire, employed as teachers and in other clerical occupations, forming a class intensely conservative, which, for the most part, keeps alive the ancient traditions and opposes everything foreign. In every town or village there is a school, taught by one or more masters. The worship of letters is like a religion, and great reverence is shown for what is written or printed. Education is almost entirely a matter of memory and the skillful use of the brush-pen; the mass of people, including many so-called educated men, have little notion of science. The Christian missionaries have succeeded in seattering broadcast translations of Western works of science and literature, and the establishment of the Tung-wen College at Peking, in which instruction is given in modern languages, science, and literature, has imbued a number of Chinese with Western ideas. The graduates of Government schools and colleges are far outnumbered by those from the missionary colleges, who have thus created a public sentiment which loudly demands educational reform. Since 1887, mathematics are required in the public examinations. Technical education is given at the arsenals and military and naval schools. In many of the treaty ports, especially in Shanghai, the centre of much educational activity, and in Hong Kong, newspapers published in Chinese circulate all over the empire.

History. The historical period in the development of the Chinese begins with the Chow Dynasty, founded in B.C. 1122. Chronicled history dates from about B.C. 770. Prior to that time there are traditions only. Legends of more or less interest point to a body of emigrants following the course of the Yellow River eastward. One school of writers, of whom the late Terrien de Lacouperie is the chief (see his *Western Origin of the Early Chinese Civilization, from B.C. 2300 to A.D. 200*, London, 1894), insists that the basic elements of Chinese civilization were derived from the Mesopotamian region. The majority of critical scholars follow in the main the Chinese authors, but reject as unhistorical the legendary notices of the period before the first history written by Confucius. Fu-hi (B.C. 2852) is considered the founder of Chinese social order. In Yao (the Chinese King Alfred) and Shun (B.C. 2357-2208), as glorified by Confucius, the Chinese find not only the patterns of regal virtue and the models of all wisdom, but the originators of their civilization and prosperity. These legendary worthies established marts and fairs, drained flooded lands, extended the empire to the sea, and, in brief, made the Golden Age of China. Their descendants became degenerate, and were supplanted by the Shang Dynasty (B.C. 1766-1154), with twenty-eight rulers, most of them vicious and cruel. The feudal system arose under the Chow Dynasty (B.C. 1122-255), by which China was governed for nine hundred years, during which period literature and the fine arts flourished. China was divided into seventy-two principalities, out of which arose several States whose names and importance, even yet in the Twentieth Century, exert a potent influence on the internal politics of China. All traces of nomadic life disappeared, agriculture became universal, and great public works were constructed. This is the classical China pictured in ancient poetry, and affecting so powerfully the imagination of the modern Chinese. Luxury, misrule, and internecine war, however, brought the nation to deep distress, in the midst of which Confucius was born, B.C. 551. The three great sages, Confucius, Laocius, and Mencius, flourished within a century or two of one another. Vice and anarchy were too great to be checked by the wise men; and in 255 the Chow Dynasty came to an end, followed by the Tsin, or Chin, from which China derives its name.

The Tsins gave five rulers to the nation, one of whom (Prince Cheng) restored order, abolished the feudal system, drove back the Hun Tartars into the desert, built the Great Wall as a symbol both of defense and of United China, and extended the empire southward of the Yang-tse-kiang Valley. To break utterly the power of feudalism, which was popular with the scholars, he beheaded hundreds of them, and ordered all literature to be destroyed. He was the first universal Emperor, or She-Hwang-Ti, a title which has been borne since by the emperors of China, and forms the basis of Chinese political orthodoxy and of China's claim to sovereignty over all the nations of the eastern half of Asia. After his death rebellion broke out, and the Han line of rulers (c.206 B.C.-190 A.D.) began. Henceforth no dynasty occupied the throne for so long a period as three centuries, most of them lasting a much shorter time. China's political organization, with its changes and developments (there have been no fewer than thirty-three dynasties), compels contrast with the stability of her social system. During the time of the Hans the Jews entered China, settling in Ho-nan Province. Buddhism was also introduced about that time. The ancient texts of Confucius were recovered and engraved on stone; ink and paper were introduced; libraries were established; and famous scholars arose. The system of competitive examinations for entrance into the civil service became an institution. The soldiers of China drove the Tartar hordes as far west as Turkestan, and added Mongolia to the empire. The Chinese still proudly call themselves 'the sons of Han.' The epoch of the three kingdoms (A.D. 190 to 265) was one of war and misrule. Under the Tsin dynasties, Western and Eastern (A.D. 265-419), the Hun Tartars menaced both the Roman and Chinese empires, and an embassy from Constantinople, sent by Theodosius, arrived at the Chinese capital. From A.D. 419 to 618 fifteen minor dynasties filled out the troubled period, during which time two Nestorian monks visited China. It was they who introduced the silk industry into southern Europe. During the great Tang Dynasty, one of the longest in the annals of historic China (A.D. 618-905), the empire extended from the Caspian Sea to the Pacific Ocean, and embassies from Rome, Nepal, Persia, Japan, Korea, Tibet, and various vassal nations often met at the Court of China. Chinese armies won victories on all sides. The Han-lin Yuan (Forest of Pencils), or the Imperial Academy (whose library, the largest in China, was burned during the siege in Peking, 1900), was founded. The art of printing by blocks imparted a powerful stimulus to native literary activity in this golden age of literature, when commerce with the Roman Empire, Egypt and the Arabs, Japan, and the East Indies also flourished. On the fall of the Tang Dynasty, through vice and effeminacy, five feeble dynasties ruled, between A.D. 907 and 960. Then the era of the Sungs (960-1126) opened, with a fresh burst of literary splendor, making the Augustan age of China, with its amazing activity of book-making and printing, and the formation of libraries.

But another great change was impending. Under the leadership of Genghis Khan, the Mongols overran northern China. Under Kublai, grandson of Genghis, who established the Mongol dynasty in China, the Chinese Empire reached its most splendid development. Kublai's realm extended from the Dnieper in Russia to the Pacific

Ocean, and from the Arctic Ocean to the Straits of Malacca. The laws were codified, and literature and public works flourished. For a half-century there was considerable commerce with Italy. Marco Polo and his two uncles then lived in the empire, in the service of the Khan, used paper money and passports, and traveled on the Grand Canal, at a time when paper money, passports, and canals were unknown in Europe. Intercourse with the Arabs and the Persians was continuous, and the highway into Europe was maintained until the Mongols in Central Asia embraced Islam and turned bigots, when communication ceased. The Mongol dynasty, one of the many foreign dynasties of China, ended in 1368, when the throne was occupied by the native Ming or Bright Dynasty, noted as patrons of the arts of peace. They cultivated friendly relations with other nations, and from them drew students to their great university in Nanking. Under their rule the Portuguese and Spaniards entered China, Canton became the centre of foreign trade, and Peking, under Ricci, the focus of Roman Christianity.

MODERN HISTORY. The last Chinese imperial line, the Ming Dynasty (1368-1644), was of low origin, its founder having risen to power in a national reaction which followed the period of disorder due to the disintegration of the Mongol Empire under the successors of Kublai Khan. The first Ming sovereign added Tongking and Cochin China to the empire. China, however, was continually harassed by the Tartars, and in 1643 the warlike Manchus, besought to defend the country against its enemies, entered it as peaceful conquerors, and a Manchu prince established himself in Peking without serious opposition, beginning the present Ta-Tsing, or 'Great Pure,' Dynasty (1644). The enforced adoption by the Chinese of the plaited queue of the Manchus at first produced friction between the races, but this gradually disappeared, and Manchus and Chinese assumed harmonious relations, although the former remained a distinct military and official caste. In most cases the customs of the country and the methods of administration remained Chinese, as did the language, and, like most numerically weak conquerors, the Manchus were assimilated to the ways of the people whom they had subdued. Kang-hi (1662-1722), the second of the Manchu emperors, was perhaps the greatest of his line. Under him the boundaries of the empire were extended, notably by the conquest of Tibet; sciences and arts were encouraged, and the great dictionary of the Chinese language was begun. His successor, Yung Cheng (1723-36), began the persecution of the Catholic missionaries. These had entered the country following in the footsteps of the Portuguese traders, who had appeared in China as early as 1516, and had been well received at first. The Chinese were never able to comprehend how adherents of the same religion could quarrel as they saw the Jesuits, Franciscans, and Dominicans quarrel, and the missionaries lost credit accordingly. Nor did the Portuguese traders conduct themselves in a way to win the respect of the Chinese, and the avarice, violence, and the spirit of bitter rivalry exhibited by them, as well as by the Spanish, Dutch, and English, all of whom in the Seventeenth Century followed the Portuguese in the Chinese field, tended to accentuate the suspicion with which the foreigners were regarded. A narrow and exclusive policy, intended to protect China from the aggression of the 'barbarians,' was initiated before the close of the Ming period, and was developed by the Manchu emperors as time went on. Mutual misunderstandings due to the collision of diametrically opposed civilizations generated continual troubles. Since the liberal days of the Mongol rulers the Chinese had been retiring within themselves, and the admission of foreigners to privileges of trade and intercourse was regarded as a special grace to inferiors. Diplomatic intercourse, in the Western sense, they could not understand, since the Emperor, the Son of Heaven, had no equals, and those who approached him could only do so as vassals. The Western nations failed to understand this point of view, and Portugal, Spain, Holland, and England tried to enter into permanent relations with the Chinese Government, with most humiliating results. Only Russia had any success in dealing with China officially before the first English war. Russia's rapid march across Asia had brought it into contact with China in the Sixteenth Century, and the first treaty made between China and a Christian power was that of Nertchinsk with Russia, September 12, 1689, by which the latter's advance on the Amur was checked. The Russians, with their knowledge of Oriental peoples, have always known better than other Europeans how to deal with the Chinese, conceding much to their prejudices in non-essentials, but refusing to acknowledge any inferiority. The United States entered the China field in 1785; and in the palmy days of the old Oriental trade the commerce of the United States was second in volume among the Western nations; but the American Government made no attempt to safeguard the interests of its citizens, or to enter into relations with the Chinese Government. England began to trade with Canton in 1635, but this amounted to little until 1664.

From 1664 until 1834 England's Chinese trade was in the hands of the East India Company, which the people of the Far East could never learn to regard as a political power. The Chinese Government looked upon the representatives of the East India Company in the same way as they regarded the *hong* merchants—a body without political status, to whom all matters regarding foreign trade had been relegated. The growth of English trade was vigorously fought by the Portuguese, who were first in the field, and wished to maintain a monopoly; but the trade and influence of the Portuguese declined rapidly after 1753, until their once prosperous station of Macao hardly paid its own expenses. The growth of European interests in the Far East created an epoch in Chinese history in spite of the spirit of exclusiveness. A crisis was precipitated when the monopoly of the East India Company came to an end in 1834, at about the same time when the heavy responsibilities to their own Government which the *hong* merchants were compelled to assume had made several of them bankrupt. Trade, which had been regulated by these two corporations, became demoralized, and under the conditions of mutual distrust and misunderstanding which already existed, trouble was inevitable. The opium traffic, a most important part of Oriental trade, brought existing differences to a head. This traffic had been made illegal by the Chinese Government in 1796, but the edicts had never been enforced. Chinese officials connived at the trade, the *hong* merchants found it profitable, and the English Government refused to suppress it. In 1837 the Chinese Government decided to carry out its decrees, and a governor, Lin, was sent to Canton in 1839 for that purpose. Lin called upon the *hong* merchants and others to surrender the opium in their possession. Elliott, the British superintendent of trade, secured all the opium in the hands of British subjects and turned it over to the Chinese Governor; but he refused to sign a bond which would have made all vessels thereafter engaging in the traffic subject to confiscation, and persons connected therewith punishable with death. The reluctance of the British Government to interfere with a trade that was worth from $5,000,000 to $8,000,000 annually to the Government of British India made all efforts to avoid war unavailing, and hostilities were opened at the beginning of 1840. After the British had captured several ports, taken Ching-kiang in a bloody assault, and threatened Nanking, a treaty was made at the latter city by which the five ports, Canton, Amoy, Fu-chow, Ning-po, and Shanghai, were opened to British trade; a war indemnity of $21,000,000 was exacted; the island of Hong Kong was ceded to England; a regular customs tariff was established at the open ports; and in consideration of a transit duty to be levied in addition, goods were given free conveyance to all places in China. The opium question was not touched upon. This first commercial treaty entered into officially by China aroused great interest in Europe and America. An embassy from the United States, headed by Caleb Cushing, negotiated a similar treaty in 1844, and a treaty with France was concluded the same year. British trade grew rapidly after the treaty, the terms of which China persistently sought to evade. In 1856 a Chinese *lorcha*, the *Arrow*, was seized by Chinese officials for alleged piracy, whereupon the owners ran up the English flag and claimed that the *Arrow* was an English boat. Thereupon England's representative in China, Sir John Bowring, made an imperative demand upon China for restitution and an apology to the British Government. His demands, though unwarranted by the facts in the case, were all met by China, except that for an apology. This the Chinese officials refused to make, and the complications arising from the incident brought on a new war in the autumn of 1856. France had an old complaint against China for the murder of some missionaries, and joined England in 1857. The war closed temporarily in 1858, with the Treaty of Tien-tsin. England and France were to have ministers at the Chinese Court, at least on special occasions, and China was to be represented at London and Paris. Christianity was to be tolerated in China. A certain measure of freedom of access to Chinese rivers for English and French merchant vessels, and to the interior of China for subjects of the contracting powers, was guaranteed. China was to pay the expenses of the war, and the term 'barbarian' was no longer to be applied to Europeans in China. Two years later it became necessary to renew the war to secure a ratification of the treaty by the Imperial Government, and this was only obtained when the allied armies held Peking at their mercy. At the time of the conclusion of the Treaty of Tien-tsin with England and France, China signed a treaty with Russia, in which she ceded the Amur territory to that power.

Meanwhile, in 1850, there had broken out in southern China a formidable insurrection, which did not fail to affect the foreign relations of the country. This was the Tai-ping Rebellion, as it was known outside. By the Chinese it was called the 'War of the Long-haired Rebels.' A schoolmaster named Hung-siu-tseuen had become possessed of a religious enthusiasm through the writings of some Protestant converts, and had set up a propaganda to overthrow Confucianism and bring China to the worship of the true God. His followers were known as 'God-worshipers.' They soon allied themselves with lawless bands of rebels against the Government. Their leader assumed the title of Tien Wang, or 'Heavenly King,' and established himself as a ruler in Nanking, where he lived a life of cruelty, license, and tyranny. The dynasty which he intended to found was named the Ping Chao, or 'peace dynasty,' which, with the prefix Tai ('great'), gave the popular foreign name to the rebellion. In the early part of 1853 the rebels had become masters of Wu-chang and Nanking, which latter place became their capital. In 1860 the treaty port of Shanghai was threatened by the Tai-pings, who thus came into collision with the Western powers. A small army, raised at the expense of the Shanghai merchants and maintained by the Imperial Government, was created. It was named the Ever-Victorious Army, and was organized and led by an American, Ward, who showed great ability, but died before much had been accomplished. His successor, Burgevine, also an American, was promptly dismissed, and the army remained under the command of an Englishman, Holland, until he was defeated at Tai-tsan, February 22, 1863. Li Hung Chang, then Governor-General of the Kiang Provinces, applied for an English officer, and Charles George Gordon was authorized to enter the Chinese service. He brought the little army of 3000 or 4000 men to a discipline and steadiness that enabled him to perform wonders with it. At the same time the French forces gave effective aid to the Imperialists. In July, 1864, the Imperialists took Nanking, and the rebellion was practically stamped out, although desultory warfare still continued for a time. Bad faith shown by Li in dealing with the defeated rebels led Gordon to refuse to serve longer in connection with him; he refused all rewards from the Emperor, but completed the overthrow of the rebels. See GORDON, CHARLES GEORGE.

The United States had watched with deep interest the progress of the second Anglo-Chinese War, and President Buchanan sent William B. Reed to follow the course of events and to mediate on behalf of this Government if that should be possible. In its friendly attitude this country was supported by Russia. The efforts of Mr. Reed resulted in a new treaty between the United States and China, negotiated on June 18, 1858. This was a treaty of amity and commerce under which the United States Government guaranteed that no American vessels should engage in contraband trade with China. The United States Minister to China from 1861 to 1867, Anson Burlingame, was so successful in winning the confidence of the Chinese administration, then in progressive hands, that upon his resignation he was asked to head a Chinese embassy accredited to eleven leading nations. In 1868 he set out from Peking at the head of an imposing deputation of the highest Chinese officials, and during the short time before his death in 1869 he did much to bring about friendly relations between China and the Christian powers. The Burlingame Treaty with the United States supplemented the Reed Treaty in some important respects. Even as late as this China had not recognized the full equality of other nations by admitting their envoys to personal audience with the Emperor, but on June 29, 1873, the Chinese Emperor, under the enlightened influence of Prince Kung and his associates, gave personal audience to the Japanese Ambassador and to the Ministers of Russia, the United States, Great Britain, France, and Holland, with the German secretary as interpreter. The significance of this audience is evident. It represented the final breaking down of Chinese isolation, and the recognition of the great powers of Europe as the equals of China. In 1884, France, in attempting to make good her protectorate over Annam (q.v.), became involved in a campaign against the Chinese forces in Tongking. The war was ended in June, 1885, by a treaty giving France control of Tongking and Annam, but leaving open the question of Chinese suzerainty.

In 1894 Japan took advantage of disorders in Korea to revive certain old claims to rights in that country (see JAPAN and KOREA), and sent an expeditionary force into the peninsula. China, which had always claimed suzerainty in Korea, but had allowed Japan to obtain distinct diplomatic advantages in 1876 and 1882, hastened to meet this demonstration, and after minor collisions had taken place Japan declared war, August 1, and on the 26th concluded an offensive and defensive alliance with Korea. On September 16 the Chinese were defeated at Ping-Yang, and on the 18th a Chinese fleet was destroyed in a severe naval battle at the mouth of the Yalu River. In November Port Arthur, in the Liao-tung Peninsula, China's strongest fortress, was invested, while the main column of the invading army pressed on through Manchuria toward Peking. Prince Kung made an appeal to the Powers for intervention. The United States offered its services as mediator, but they were declined by Japan. Port Arthur was taken on the 21st. The Japanese pushed their operations vigorously, without regard to the approach of winter; defeated the Chinese at Kung-wa-sai, December 19; captured Kai-ping, January 10, 1895; and the strongly fortified port of Wei-hai-wei, in the Shantung Peninsula, on February 14. The loss of Wei-hai-wei, together with the remnant of her navy, left China at the mercy of her enemy, with Peking in imminent danger of capture. Li Hung Chang (q.v.) was commissioned to negotiate a peace. By the Treaty of Shimonoseki, April 17, 1895, China recognized the full independence of Korea, ceded to Japan the peninsula of Liao-tung, the island of Formosa, and the Pescadores, and agreed to pay an indemnity of 200,000,000 taels. A new commercial treaty with Japan, much more favorable than that which had been invalidated by the war, was promised. Japan was to retain military occupation of Wei-hai-wei until the commercial treaty was made and the second installment of the indemnity paid, the balance of the latter to be secured by pledging the customs revenue. The collapse of China surprised most of the world, which had been taught to believe that there was tremendous reserve force and power of endurance in this unwieldy but ancient empire. The revelation of its weakness seemed to be just the opportunity for the great European Powers that were ambitious of influence in the Far East. Russia, France, and Germany promptly protested against the cession of the peninsula of Liao-tung, and brought such pressure to bear that Japan relinquished this part of its conquest.

In the weakened condition of the Chinese Government, it was more than ever apparent that political influence must go hand in hand with commercial development in China. The embarrassments of the Imperial Government resulting from the war afforded an opportunity to the Powers to obtain valuable concessions. Russia in 1895 placed, through France, a loan amounting to $77,200,000, to enable China to meet the payments of the indemnity. In 1896 the sum of $80,000,000 was provided by German and American capitalists, and in 1898 the same amount was advanced by the Hong Kong and Shanghai Banking Corporation and the Deutsch-Asiatische Bank. In return for these loans, valuable railway and trading concessions were exacted, with a view to establishing in the decaying empire spheres of influence which could in any event be guarded against dangerous rivals. In 1897 Germany, by way of reparation for the murder of two German missionaries, seized the port of Kiao-chau, on the Shan-tung Peninsula, and obtained from China extensive mining, trading, and railway privileges in the rich Province of Shan-tung. In the early part of 1898, while the British Government was endeavoring to secure guarantees that the Yang-tse-kiang region should not be alienated in any way, and that the river should be more freely opened to navigation, Russia obtained a lease of the harbors of Port Arthur and Ta-lien-wan in the Liao-tung Peninsula, with railway concessions in the adjacent territory. As an offset, Great Britain at once demanded and obtained Wei-hai-wei on similar terms.

The danger to China from the foreign Powers now became so evident that two parties appeared, divided upon the method of resistance. One was a nationalist reform party, led by Kang Yu-Wei, a Cantonese, and including Chang Chih Tung, the Viceroy of Hu-peh and Hu-nan; the other a reactionary conservative party, inspired by the Dowager Empress. For a brief period the reformers seemed to have gained control at the palace, and held the ear of the young Emperor, Kwang Su. Their wish was to bring China into the ranks of modern nations, along the road which Japan had trod so swiftly and so surely, and to throw off foreign influence by creating a strong and independent Chinese nation. Numerous edicts issued from the palace during the summer of 1898, which seemed to point to the regeneration of China. But against this attempt at reform by proclamation there were the inertia of the most conservative of people, the hatred of all things foreign, and the constant intriguing of the Empress Dowager, a relentless and unscrupulous woman, mother of the late Emperor Tung Chih and aunt of the present ruler, whom she had put upon the throne. Long accustomed to control the affairs of the palace, she kept the weak young Emperor in subjection. In September, 1898, he issued a proclamation practically transferring the sovereign authority to her, and confessing himself sick in body and mind. From that time he was lost sight of, and rumors of his death became frequent. A number of the reformers were executed, but Kang Yu-Wei escaped and went into exile. Anti-foreign demonstrations in many quarters began almost immediately, and marines were sent to Peking from the foreign naval vessels on the China station, to guard the legations. Assaults on the missionaries and destruction of their property became of frequent occurrence, and it was evident that the exactions and dictatorial ways of the foreigners had irritated the Chinese. If the liberal reformers could have had their way, the difficulty might have been peaceably met by creating an orderly, civilized government, that would command the respect of the world; but with the triumph of the reactionaries in the Government, the spirit that was abroad found vent in violent and barbaric outbreaks that only served further to discredit China with civilized nations. The seizure of full power by the Empress Dowager was marked by the substitution of Manchus for Chinese in the higher offices, which meant the infusion of a more brutal and violent spirit in the Government. In January, 1900, the puppet Emperor was heard from once again, in a proclamation made by the orders of the Empress Dowager, naming Pu Chun, son of Psai Yi, Prince Tuan, as the successor to the throne.

Reports were heard soon after of the activity in Shan-tung of the organization popularly known as the Boxers (a very free translation of the Chinese name meaning 'The Fist of Righteous Harmony'). This organization and another which seems to have become identified with it were apparently the beginnings of a patriotic volunteer militia which was intended for the defense of the country against foreign aggression. It had at the outset the favor of many really well-meaning men, but it soon came into the control of fanatics, whose motto was, 'Exterminate the foreigners.' As reports of its acts began to come in, the foreign ministers made frequent representations to the Tsang-li-Yamen, or Board of Foreign Relations, but without obtaining any satisfaction. Matters went from bad to worse, until the very legations in Peking were threatened by the reign of terror which enveloped the capital. A relief force of 2000 marines and sailors from the allied foreign fleets set out for Peking, June 10, under the command of Vice-Admiral Seymour, the British commander, but this force was unable to reach Peking. On June 11, the chancellor of the Japanese legation was murdered in Peking by Chinese soldiers. Already there was little doubt that the Boxer outbreak was encouraged from the palace. On June 17, the allied fleets bombarded and captured the Taku forts. Three days later Baron von Ketteler, the German Ambassador, was murdered in the streets of Peking, on the way to the Tsung-li-Yamen. The diplomatic corps, together with their households and guards, before the end of June, were all gathered in the British legation, which was fortified as well as possible. Cut off from all communication with the outside world, they endured the horrors of a siege for nearly two months. Meanwhile an allied army of relief had been assembled at Taku. It captured Tientsin on July 14, and advanced to the relief of the besieged legations. The march began on August 4, the force numbering about 18,000 men—Japanese, Russian, British, American, and French. Peking was reached and the legations were relieved on the 14th, the Imperial City being taken on the following day. The Court escaped into the interior. On the 28th troops of all the nationalities represented (now including some bodies of Germans also) marched through the sacred precincts of the Forbidden City, as a symbol of the humiliation of China. The advance on Peking and the occupation of Chinese territory was attended with much looting, brutality, and license, not at all creditable to the Christian nations. Li Hung Chang and Prince Ching were commissioned to treat with the Powers, and after months of wearisome negotiation, prolonged by the differences among the Powers and by the peculiar methods of Oriental diplomacy, a protocol embodying the terms of peace to be imposed upon China was submitted to the Imperial Government. This document set forth the expiatory measures imposed upon China on account of the Boxer outrages; forbade the importation of arms and ammunition or the materials for their manufacture; provided for the payment and distribution of an indemnity of 450,000,000 haikwan taels, or $333,000,000; the conversion of ad valorem into specific duties, and the improvement of the Pei-ho and Whang-pu rivers, at the joint cost of the foreign Powers and China; prohibited Chinese membership in anti-foreign societies under pain of death, and abolished Government examinations for five years in cities where foreigners had been massacred; ordered the dismissal of governors who should hereafter permit anti-foreign agitation; and transformed the semi-official Tsung-li-Yamen into a ministry of foreign affairs, the Wai Wu Pu, taking precedence of the other ministries. A legation district in Peking which might be fortified and guarded was defined, and certain points were indicated that might be occupied by the foreign Powers to keep communication open between the capital and the sea. In accordance with this protocol, all foreign troops except the legation guards were to be withdrawn in September, 1901, and the status quo was to be reestablished.

In an Imperial edict issued in February, 1901, China accepted these terms. While the Boxer movement was in progress and the siege of the legations in Peking was going on, the Chinese forces made a vigorous and at first irresistible advance against the Russians in Manchuria, which became the scene of bloody warfare. In July, 1900, the Chinese cannonaded Blagovyeshtchensk, on the Amur River. Russia assembled large forces which finally drove back the enemy, and at the beginning of October Mukden was in Russian hands. During the progress of the peace negotiations, the Powers dispatched punitive expeditions in various directions, these operations continuing into the spring of 1901. In June, 1901, Count Waldersee, who had been at the head of the allied forces in China, laid down his command. In January, 1902, the Chinese Court returned to Peking. On April 9, 1902, the 'Manchurian Convention' between Russia and China was sealed by the Chinese Emperor. Under its provisions Russia agreed gradually to retire from Manchuria in eighteen months. Russia's control over the Manchurian Railway, however, was to remain unimpaired.

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CHINESE GORDON. The name given to Gen. Charles George Gordon from his exploits in putting down the Tai-ping Rebellion in 1863.

CHINESE HEMP. See Corchorus.

CHINESE IMMIGRATION. This subject first assumed importance in the United States about the year 1870, although legislation hostile to the Chinese began in California in 1855. The California Legislature investigated the subject in 1862 and the United States Congress sent a joint special committee to the Pacific Coast in 1876, the voluminous report of which gives the most authentic information on the subject yet published. (Rep. 44th Cong. 2d Sess. Sen. R. 689, pp. 1281, Wash. 1877).

Up to 1868 the United States was trying to compel China to admit Americans into that country for the pursuit of trade and commerce. The first treaty (1844) with China gave Americans the right of residence in five ports and gave them the rights of extra-territorial consular jurisdiction. The Americans, though not participating in the Chinese war of 1858, secured all of the privileges obtained by other nations, which were stipulated in the Reed Treaty of 1858. Nothing was said in these treaties about Chinese in America, who came here under the same conditions as the citizens of other nations. The Burlingame Treaty of 1868 deprecated involuntary immigration—aimed at coolie labor—but declared the right of migration to be an inherent one, and a special resolution of Congress (July 27, 1868) declared the right of expatriation to be a natural and inherent right of all people, the obstruction or restriction of which is inconsistent with the fundamental principles of the republic. This declaration became subsequently an object of embarrassment in dealing with the Chinese when anti-Chinese feeling on the Pacific Coast made it necessary for both political parties in 1876 to insert anti-Chinese planks in their platforms. The question of abrogating the treaty of 1868 was discussed in Congress. A bill to restrict Chinese immigration passed both Houses of Congress in 1879, but was vetoed by President Hayes because it violated the Treaty of 1868. A commission was sent to China in 1880 to negotiate a new treaty to permit the absolute prohibition of Chinese immigration. The Treaty of 1880 declared that "the Government of the United States may regulate, limit, or suspend such coming or residence, but may not absolutely prohibit it." The treaty further stated that the limitation must be reasonable and apply only to Chinese laborers. The act of 1882 suspended the immigration of Chinese laborers for ten years and gave those in the United States or those who should arrive within 90 days after the passage of the act the right to remain, but forbade the naturalization of Chinese, and the act applied to both skilled and unskilled laborers. The act was amended in 1888, while a treaty, in which the Chinese Government undertook to prohibit Chinese laborers from coming to the United States, and our Government agreed to protect those here from the violence and outrages to which they were constantly subjected without redress, was still pending. The amendment prohibited the return on certificate of Chinamen once here who went back to China, declared all such certificates void, and practically made Chinese exclusion permanent. This act angered the Chinese Government, which did not ratify the treaty. The act of 1882 expired in 1892, and the Geary law continuing the exclusion for a further period of ten years was passed May 5, 1892. President Roosevelt recommended in his message to Congress, December, 1901, the continuance of this policy, and the general sentiment both in and out of Congress still favors Chinese exclusion and will demand further legislation to this end.

The methods by which Chinese exclusion has been accomplished have not been above reproach, but public opinion forced radical action on the part of the Government. It is asserted by those who advocate Chinese exclusion that the Chinese come here not in families, but chiefly as male laborers for a temporary stay, to secure about $1500 in savings and then return to China with a competency. The difference between the American and Chinese civilization makes it almost impossible to assimilate them. They work for low wages and live very cheaply. Whether or not they would ever come to this country in sufficient numbers to constitute a menace to the economic interests of American labor, which the American workingman supposes, is doubtful.

The number of Chinese who came to the United States from 1848 to 1852, when they began to come as a result of the gold discoveries, is estimated at 10,000. From 1852 to 1854 the excess of arrivals over departures amounted to 31,861. During the next 15 years the annual departures were about as great as the annual arrivals; 1868 showed a net gain of 6876, and from that year down to 1876 the net gain was about 11,000 per annum. The census of 1880 showed 105,465, exclusive of Hawaii; 1890, 107,488; 1900, 89,863. Consult Mayo-Smith, *Emigration and Immigration* (New York, 1895). See Immigration.

CHINESE LANGUAGE, WRITING, AND LITERATURE. The language of China is ancient and important because of the vast number of human beings speaking it; but it ranks among the most rudimentary forms of speech that have maintained a long existence anywhere in the world. It has matter-elements and nothing else; besides this, it is monosyllabic, each word being uttered by a single movement of the organs of speech, and expressing a complete idea or thing. It is characterized by the unchangeability of the root. Hence it is without inflections or distinct parts of speech. The relation of a word is recognized by its position in the sentence. The same word may serve as noun, adjective, verb, or adverb. Gender, number, person, and case are signified, not by the form of the word itself, but by related additional words. Position is everything in the construction of Chinese sentences. Chinese is one of the simplest languages in the world, and at the same time one of the most difficult; for while there is no grammar except syntax, to be a scholar one must learn the book language in its two or three different forms, the colloquial or spoken languages in their various vernaculars, and the tones (as many, it may be, as seven to a single sound), which increase the number of simple words or roots from nearly 500 to 1200 or more. It is very difficult for a Western man to be a master of the Chinese tones. The variety of dialects and their difficulties are overcome by what is commonly called the 'mandarin' or Court dialect, the medium of official communication, which, though phonetically the poorest of the dialects, has received considerable literary cultivation. There is a vast difference between the literary and colloquial idioms. Yet though poor in form—indeed, one of the poorest—the Chinese language has been made, through ages of cultivation, and solely by the genius of those who use it, superior as an instrument of thought to many, perhaps to most, inflected languages. "The contrast between the means and production in Chinese," says Steinthal, "is a perfectly unique phenomenon in language history."

If, as seems probable, this language came originally with the primitive elements of Accadian civilization from Western Asia, it is logical to connect its written character with the Accadian or proto-cuneiform ideographs of ancient Mesopotamia. These symbols, at first few in number and derived from natural or artificial objects, became stereotyped by use and so modified by contractions as presently to lose all resemblance to the original hieroglyphs. Native philologists seem to recognize some such process as this in arranging their language in 'six writings' (*luh shu*), 608 imitative symbols, 107 signs of thought, 740 combined ideas (e.g. 'woman' and 'broom' denoting a wife), 372 inverted significations (the character for 'hand' turned one way meaning 'right,' the other 'left'), 21,810 phonograms—the bulk of the language—combining an imitative with a sound symbol, and 598 metaphonic symbols and combinations, for the most part accepted conventions difficult to explain. This constitutes a vocabulary of 24,235 separate words, which is approximately the total of words in good usage; though this is increased by obsolete and compound characters in Kang-hi's dictionary to 44,449. Here, as elsewhere, however, the vocabulary of ordinary life is much more limited, not far exceeding 3000; that of the nine canonical books is only 4601. Doubtless the aspect of the written character underwent a change upon the invention of the hair pencil or brush, ascribed to a general in the Third Century B.C., when the hard stylus ceased to be used; and other changes in the mechanics of writing must account for the obliteration of almost every semblance of its hieroglyphic origin in the modern script. Some examples of such modifications from supposed original forms are given in the illustration. There being no alphabet in Chinese, the difficulties in arranging this assemblage of arbitrary signs are very great. After various phonetic plans had been tried, the characters were classified in the Sixth Century by selecting the most significant part of each as its key or radical, and by grouping together those in which the same element occurred. These groups were subsequently reduced from 542 to 214 in the Sixteenth Century, the characters under the same radical being listed consecutively according to the number of strokes required to write the extra-radical portion. This latter part—usually called the primitive—may be written above, below, on either side, or inclosed within the radical; it is necessary, therefore, to become perfectly familiar with these 214 signs before the first step can be taken in acquiring a knowledge of the written language. The number of characters listed under each of these in the dictionary varies from 5 to 1354. A remarkable limitation in Chinese is the paucity of its sounds, hardly more than 400 in all. The difficulty arising from this is relieved by the employment of tones, mentioned above, and by breathings or aspirates (e.g. *t'ang* and *tang* are two different words); but in spite of these the number of homophones is excessive and embarrassing, and the spoken tongue, with its varying dialectic pronunciations of the same written character, may be considered the most difficult in the world for an alien to acquire. Great attention is paid to its calligraphy; no educated man allows himself to write carelessly, and the appearance of a written or printed page of Chinese characters in vertical columns is more ornamental than that of a page in any other language. Six different styles of script are recognized, of which only two—the 'pattern' and 'running' hands—are in common use. Finally, in addition to the difficulties already enumerated, it may be said that a language which cannot express by single words such abstract ideas as space, relation, etc., must have severely restricted the intellectual development of the race compelled to employ it during forty centuries of comparatively high civilization.

LITERATURE. The history of Chinese literature is long—going back perhaps eighteen or twenty centuries B.C.; though, owing to the lack of durable monuments, there are no credible texts of very ancient inscriptions in China, as there are in Babylonia and Egypt. By the Sixth Century B.C., when Confucius edited the famous sacred canon known as the *Ching* (*King*), there evidently existed a considerable literature in verse and prose already considered old. To the *Ching*, the model of literary form, the acme of philosophic wisdom, is largely due that extraordinary stability of Chinese thought and institutions which is the wonder of their history. They consist of the 'Five Classics'—*I Ching* [*Yi King*], the "Book of Changes"; *Shu Ching*, the "Book of History"; *Shih Ching* [*Shi King*], or "Book of Odes"; *Li Chi* [*Li Ki*], or "Book of Rites"; and the *Ch'un ch'iu* [*Ch'un Ts'iu*], or "Spring and Autumn," the last being the only one claiming Confucius as the actual author—and to these are added the 'Four Books': The *Lun Lü*, or "Analects," of Confucius, his views and maxims retailed by disciples; the "Book of Mencius"; the *Ta Hsüeh* or "Great Learning"; and the *Chung Yung* or "Doctrine of the Mean," a short treatise enlarging upon Confucius's teaching as to conduct, and ascribed to his grandson, K'ung Chi. These classics of the Far East constitute as interesting a body of literature as can be found in any ancient civilization. No written product of the human mind has for so long a period, or so completely, molded the culture, morals, and government of a large fraction of civilized mankind. Its profound and continuous study has not only left abiding traces upon Chinese thought and institutions, but has, through veneration for the letter as well as the spirit, preserved the language almost unchanged during three thousand years, set a permanent standard of literary style, and stimulated the critical faculties of an acute people to the production of thousands of volumes of commentary and discussion. The

"Book of Changes," probably the oldest of the 'Five Classics,' is ascribed to Wên Wang, founder of the Chou (or Chow) Dynasty in the Twelfth Century B.C. It consists of a series of apparently random deductions based upon the groupings of divided and undivided lines said originally to have been copied and arranged from the back of a tortoise by the chief Fu Hsi, thirty-three centuries B.C. The eight diagrams of triplet lines (thus. ☰, ☷, ☱, etc.) were enlarged to sixty-four by doubling into sextets, each representing some natural force or element and followed by a short essay ascribing to every line its highly fanciful and allegorical import. The text is followed by ten *wing*, or commentaries, long ascribed to Confucius, but unquestionably of later origin. It is impossible to do more than guess as to the real purpose of this antique puzzle, foreign speculators calling it a philosophy, a vocabulary of pre-Chinese tribes, a calendar of the lunar year, etc., while the natives persist in venerating it as divinely inspired, though they cannot interpret its true meaning. The "Book of History" embodies, like the Hebrew Scripture, fragments of very ancient documents; but its present form is the work of Confucius, who infused into its brief and rather monotonous records his ideas of virtue, statecraft, and philosophy. Though its text is not always beyond dispute, this record places China indisputably in the first rank of Asiatic nations for its authentic data on ancient times. Scarcely less important in this respect, and as a sociological document, is the "Book of Odes," while its human and literary interest far surpasses all the other *Ching*. This poetical relic consists of 305 odes, chants, and ballads, said to have been garnered by the Sage from 3000 songs current in China at his time. They date from the Eighteenth to the Sixth Century B.C., and many if not most of them seem to have a religious use and meaning; but it is hardly possible to exaggerate their interest to the scholar as true pictures of the life and thought of antiquity, or their value in illustrating the language, cults, and customs of old China. They have inspired eighty generations of Chinamen since Confucius expressed approval of them by declaring that "He who knows not the *Shih* stands with his face toward a wall." The fourth classic, the "Book of Rites," does not properly belong to the Confucian period, being the compilation of two cousins named Tai, in the First Century B.C. It got its present form after remodeling in the Second Century A.D., and until the Fourteenth Century was always joined with two older works—the *Chou Li* and *I Li*—both devoted, as it was, to ceremonial forms and usages. The "Spring and Autumn Annals" is the title of a brief record of Confucius's native State between the years 722-484 B.C., written by the Sage himself, a book upon which he considered his reputation would stand for all time. It is hardly more than a simple statement of events, devoid of comment or interest, but its dry annals were expanded by the illuminating commentary of his disciple, Tso, who made it altogether one of the most readable accounts we have of the remote past, earning for its author the title of the Froissart of ancient China.

The 'Four Books' are the works of three disciples of the Sage and of Mencius, his great expositor, in the century following his death. The "Analects" gives some accounts of the habits and records the teachings of the great moralist as nearly as possible in his own words, thus forming an invaluable repository of information about Confucius and his moral system. In this is formulated the famous text of altruism, the Golden Rule in its Chinese form, "What you would not others should do unto you, do not unto them;" and here are expressed his ideas as to the nature of man, the necessity of education, of etiquette, of self-repression, of filial surrender, and here his agnosticism stands out in bold relief. The "Book of Mêng tsz'," or Mencius, supplies at rather greater length the teachings of Confucius's greatest follower, a man who subordinated his whole doctrine to the system of his master, but who in breadth and strength of character seems to have been superior to the Sage himself. Like Socrates, he devoted himself to crushing the sophists of his time, and through his learning and influence in combating heterodox philosophers he may be said to have established the supremacy of the Confucian system in the mind of China. As third among the 'Four Books' comes the *Ta Hsüeh* [or *Hioh*], the "Great Learning," once constituting a chapter of the "Book of Rites." It enlarges upon the regulation of the individual, the family, the State, and the Empire, and has conduced, theoretically at least, to the maintenance during successive ages of China's political solidarity under a system allowing considerable liberty of home rule. Lastly, the *Chung Yung*, also originally a section of the "Book of Rites," develops the idea of the princely man who, basing his actions upon the principle of *ching*, or uprightness, and submitting to the all-pervading *ho*, or harmony of the universe, never departs from the just mean. From this source come in great part the attitude of calm and the assumption of impartiality studiously cultivated by Chinese gentlemen.

In a sense these classical works may be considered the sum and substance of Chinese literature, for not only have the example and ethical system of Confucius become supreme over the minds of his countrymen, but forms of thought and style have ever been kept subservient to these early products of the national genius. Confucius did much for his people, but he has much to answer for in repressing original speculation, freedom of research, and imagination by a colorless formalism. Such was the idea of the 'First Emperor' Ch'in, who two centuries after the death of Confucius consolidated feudal China into a real empire and greatly extended its domain. In order to combat the conservative *literati* who resisted his violent and rapid reforms by preaching the doctrines of the dead past, he decreed in B.C. 213 the destruction of all books excepting those on science, agriculture, and divination (the last saving the *I ching* alone of the classics), and forbidding their reproduction or study. The edict, which was carried out with extraordinary thoroughness, brought death upon 460 recalcitrant scholars, and forms an epoch in the history of Chinese letters. The tyrant's dynasty did not endure long, and within a half-century of his death the ancient learning was revived with double zest under the Han Dynasty (B.C. 200-A.D. 200). The new zeal also brought with it a harvest of forgeries of old works alleged to have been discovered in hiding-places, but really efforts of clever writers to imitate the resuscitated ancients, whose prestige in eastern Asia always far exceeds the most brilliant successes of authors among their own contemporaries. Before touching upon this revival of learning in China, however, it is proper to refer briefly to the non-Confucian literature of Taoism and the mystics. The philosopher Lao-tsz', an earlier contemporary of Confucius, gave birth to a philosophy of quietism, the esoteric meaning of which is hard to determine. The pursuit of *tao*, as set forth in the *Tao-te ching*, a work ascribed (improperly) to the teacher, suggests Hindu transcendentalism and may be derived from India. In its purity it never took much hold on the practical and worldly-minded Chinese, but idealists exist even there, and to these such speculations have invariably appealed. In the Fourth Century A.D. there arose an author (Chwang Tsz') who illuminated for his followers the dark places of *tao*, and by the charm and erudition of his style elevated his exposition to a high place in the literature of a country where style atones for all heresy. The history of the sect of *tao*, which passed from pure mysticism to the utmost pretensions of alchemy and divination, does not belong here, nor is there much more than this to be said of the numerous writings of the Buddhists, which begin here in the First Century A.D., but which have never greatly affected the literary life of educated China.

While elucidations of the Confucian canon constitute an important part of the literary output of China during its mediæval period, the chief distinction of the Han era comes from the development of poetry and of historical writing. To Mei Shing (Second Century A.D.) belongs the honor of first exhibiting the beauties of the five-word metre, in which form have been produced the finest specimens of the poetic art in the language. Rhymes are of course easily found in a monosyllabic language of few sounds, but Chinese verse calls for similar tones to perfect the rhyme and demands also the disposal of rising and falling tones in the line in accordance with a scheme which recalls the niceties of metrical arrangement among the Greeks. The identification of the human mood with nature, which was almost unknown in Europe until modern times, appears strong and fresh as a poetic *motif* in China, as elsewhere in the East, from very early ages. In our comprehension of their art, however, the need of translation is a portentous obstacle: whatever the care of the translator, there must always remain differences in standpoint, in mode of life, and intellectual environment to thwart and prejudice the resulting effect upon readers in an alien land. Where every chance allusion to history and familiar custom, where nature herself, as exhibited in an exotic clime, require explanation before the sense is secure, it is hard to keep the flowers of Chinese verse from withering when transferred to another speech. In history the language, of course, fares better, and scholars have reason to look for larger results from translations of the standard Chinese historians than from those of any other Asiatic peoples. First of these authors in time and reputation—next to Confucius, who preached but could not write history—is Sz'-ma Ch'ien (born B.C. 145), whose 'Historical Record' relates the history of China from the beginning down to nearly his own period. Its 526,500 words, all originally scratched on bamboo tablets with a stylus, have been conned and counted with such affectionate care in subsequent ages as to have become the unvarying type of historical presentation in China ever since. Each dynasty has made it a serious business to compile the nation's annals during the preceding dynasty as well as to collect records for its own reigns, and the twenty-four dynastic histories produced in a uniform set of 219 volumes in 1747 are an exhibit of intellectual activity creditable in the extreme to the Chinese mind, even if their pages do not glow with marks of genius or lofty imagination. These official histories are supplemented by private memoirs, local annals, travels, and topographies, and at long intervals authors have appeared to continue the work of Confucius and Sz'-ma Ch'ien by revising and condensing the national history into acceptable literary form. Such have been Sz'-ma Kwang, whose history in 360 books appeared in the Eleventh Century, and Chu Fu-tsz', who issued an 'abridgment' in 55 books in the Twelfth Century. On the whole, the mass of historical literature of all kinds in China may be called enormous, a mine as yet almost unworked by European students. In the rather scant literature of foreign travel should be mentioned the accounts of the journeys of the Buddhist pilgrims Fa Hsien in the Fourth Century and of Hsüan Tsang in the Seventh Century to India in search of holy books and images. They seem to have inspired in China no lasting interest in foreign lands or desire to travel abroad, but by the efforts of these and other priests in translating Buddhist books much of the literature of that creed which would otherwise have perished in its extinction in India has been preserved for the researches of modern scholars.

After a long period of political disturbance and comparative intellectual sterility following the fall of the House of Han, there arose the T'ang Dynasty (A.D. 600-900), during which China may be said to have reached the zenith of its intellectual life. "Poetry," declares a Chinese critic, "began with the *Shih*, developed with the *Li Sao*, burst forth and became perfect under the T'angs. Much excellent work was achieved under the Han and Wei dynasties: their writers appear to have selected good subjects, but their language was unequal to its expression." It was notably the age of lyric verse, expressed in a language which had by this time become refined and adapted to the highest literary purposes. Long flights are almost never attempted, the epic being a product altogether alien to the Chinese mind: but as tests of skill under great technical difficulties the eight-line poem and the still harder four-line epigram or 'stop-short' have remained favorite forms. Professor Giles describes the invariable arrangement of the two conventional tones in the latter stanza as follows:

Sharp sharp flat flat sharp
Flat flat sharp sharp flat
Flat flat flat sharp sharp
Sharp sharp sharp flat flat

"The effect produced by these tones," he says, "is very marked and pleasing to the ear, and often makes up for the faultiness of the rhymes, which are simply the rhymes of the odes as heard 2500 years ago, many of them of course being no longer rhymes at all. Thus there is as much artificiality about a stanza of Chinese verse as there is about an Alcaic stanza in Latin. But in the hands of the most gifted this artificiality is altogether concealed by art, and the very trammels of tone and rhyme appear to be necessary aids and adjuncts to success." The names of famous poets in this era are legion, and it would be difficult as well as useless to enumerate them. Anthologies of the period are numerous, and always studied for their famous poems, as they are set as standards for imitation. The 'Complete Collection,' published in 1707, contains nearly 50,000 poems of all sorts arranged in 900 books. Chief among their poets must, however, be mentioned Li Po (705-762) and Tu Fu (712-770). The former, a sort of Chinese Anacreon, enjoyed immense popularity, became a spoiled child of the imperial palace, where he performed prodigies of impromptu verse-making when too drunk to stand, fell a victim to Court intrigue, and was drowned at last, very appropriately, in a maudlin attempt to kiss the moon's reflection in a river. Rather curiously, the Chinese, though a temperate people, are passionately fond of songs in praise of wine and rejoice in a long array of poets who were more or less drunkards. On the other hand, their literature as a whole is singularly pure, standing in this respect high among those of Orientals, though social life among them is far from clean, and obscenity in familiar intercourse is often if not always condoned. Li Po's contemporary, Tu Fu, was also a Court officer and favorite, and likewise compelled to retire. His career resembled that of Villon and ended in the mire, but his name has been for a thousand years a household word in Asia. One of his verses will serve as a sample of the *summum bonum* of Chinese poetic art and as an illustration of what is admired in the four-line lyric epigram:

> "White gleam the gulls across the darkling tide,
> On the green hills the scarlet flowers burn;
> Alas! I see another spring has died . . .
> When will it come, the day of my return?"

It is perhaps creditable to Chinese institutions that many of their great writers have been men of official rank. In a land where the road to office has long lain through the study of letters this has resulted in efforts more or less serious on the part of every mandarin to 'write,' and produced in the aggregate a long list of respectable works. Among these the poet, philosopher, and statesman Han Yü (768-824), of the dynasty of T'ang, stands preëminent as a model of nobility of character, ability in high office, and remarkable elevation of literary style. His career is familiar to every well-read Chinaman, one of his compositions being customarily read by the bier as a part of the funeral service, while another, his protest to the Emperor on the subject of receiving a bone of Buddha with imperial honors, an ode which caused him a long banishment, is one of the favorite 'pieces' for reading in the language. Several women emerge from the obscurity of female life in this time and take their places among the famous men of letters in China, a galaxy which knows neither creed nor sex, which stands or falls only by the great test of an approved style.

The literary life of China decreases in originality and power after the great T'ang period, but some phases of its later periods are notable for various reasons. The Sung and some minor dynasties cover the Tenth and Twelfth centuries, during which renewed attention was paid to history, and Sz'-ma Kwang (1019-86) and Chu Hsi (1130-1200) flourished. The latter, one of the most remarkable minds China ever produced, is famous not only as a historian, but as a philosopher, and it is his original interpretations of the classics that constitute the system or code commonly called Confucianism by foreigners. The rise of metaphysical speculation may be said to be the distinguishing mark of this era, within which, however, no phase of literature or learning was neglected and during which the invention of block printing (Tenth Century) gave great impetus to book-making and the formation of libraries. The Mongols themselves added nothing to China's intellectual life, but their dynasty is marked by the introduction of the drama and of novels. Both of these forms of literature are as important now in China as elsewhere, and it is remarkable, in view of the passion common to all Asiatics alike for the story, that the art of fiction in its two highest forms should have been so tardy in developing here. Chinese plays, contrary to the notion accepted in the West, are usually very short, their plots being often ingenious and highly melodramatic, but seldom complicated. No scenery is used, and some of the accepted conventions are naïvely frank. The plays follow each other without change of scene or intermission, the sessions, like school hours in China, lasting all day long. Novels under the Ming (1368-1644) and present dynasties absorb increasing attention and show great ability, though the plots are often too long and intricate and the characters too numerous to suit the taste of Europeans. Their short stories are, at their best, altogether admirable, if their almost invariable introduction of the supernatural be allowed, some of them, like the *Strange Stories* (1679), ranking among the world's best *contes*. China, like modern Europe, has during recent centuries passed through the encyclopædic age, when scholars have devoted themselves to amassing great repertories of the literature, knowledge, and wit of past generations. No country, in fact, surpasses this empire in the wealth and variety of her dictionaries and encyclopædias of all kinds, but these can hardly be called literature. Nor does the often scurrilous wit of their proverbs and gross wall-literature—anonymous placards frequently found on street-corners—call for mention in an account of Chinese letters. The intellectual record of the race is, on the whole, one to be proud of and deserves more attention than it has yet received from Western scholars.

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CHINESE MUSIC. The music of no other nation presents such a vast difference between the theoretical writings and the practical execution as does that of China. The theory of music had reached a high state of development at the earliest times of which we have record; but the practical execution of music was then, and is still to-day, nothing else than a barbarous, cacophonous combination of noises worthy of the rudest savages. The oldest Chinese scale consists of but five tones: F, G, A, C, D. The names of these tones were *kung, chang, kio, che, yu.* For centuries this incomplete scale remained in use until Tsay-Yu introduced, against violent opposition, the two remaining tones B, E, known as *pien-chung* (the mediator) and *pien-ho* (the leader). Strange to say, from the very beginning the Chinese theory was acquainted with the full octave and its division into twelve semitones. Each semitone was called *Lü.* The idea was conceived of arranging a series of twelve bamboo pipes so that each pipe would produce one Lü. As the older hymns, moving within the compass of the old five-tone scale, could not be adapted to this new device, the pipes were divided into two series, in each of which the progression should be by whole tones, one called perfect, the other imperfect:

(1.) Series F, G, A, B, C♯, D♯—perfect.
(2.) Series F♯, G♯, A♯. C. D. E —imperfect.

This progression of whole tones was soon found unsatisfactory. As the result of various experiments a new scale, consisting of fourteen tones, was adopted. This began with the tetrachord B. C, D, E, to which was added the octave F, G, A, B, C, D, E, and three tones above, F, G, A. Within this compass our C major scale is comprised, and the fact that the tones have the same names in different octaves proves that the Chinese understood the principle of the octave. But F was still regarded as the fundamental tone. The fifth tones above and below F are regarded as its helpers, for by means of progression in fifths it was possible to arrive again at the starting tone: F—C—G—D—A—E—B—F♯—C♯—G♯—D♯—A♯—E♯ (F). The first seven of these tones, in the progression, are called 'principles,' the other five 'complements.' The fifth above is called *Ta-Kinen-Keu* (great interval), the fifth below *Tchao-Kinen-Keu* (small interval). Every Lü or semitone may be taken as the fundamental tone (*kung*) of a scale, and thus the same scale can appear in twelve transpositions. As, moreover, every Lü can change its place seven times within the same scale (i. e. it may be on the first, second, third, etc., step), there arises the total number of 84 scales.

The musical instruments of the Chinese are strictly divided into eight classes, according to the material employed to produce a tone. One of the chief instruments is the *king*, consisting of a frame on which are hung stone plates, which are struck by a mallet. There are in all sixteen plates, hanging in two rows. They are tuned in the twelve Lüs of the octave and four additional tones. The *nio-king* is a *king* made of especially fine plates, and this instrument is to be played only by the Emperor himself. The *cheng* is a peculiar instrument somewhat resembling a small organ. It consists of a gourd over which are arranged 12 or 24 bamboo pipes closed at the lower end with metal plates, with which are connected reeds. Each pipe has a hole which is stopped with the finger to produce the tone. The necessary wind is produced by a bellows. The cheng is the diapason of the Chinese. By it all other instruments are tuned. The *kin* is a stringed instrument with twenty-five strings made of twisted silk. *Yo* and *che* are flutes made of bamboo. The *or* is seriously regarded as a musical instrument. It consists of a wooden image of a tiger. The end of a concert is indicated by striking three blows upon the head of this tiger and running a small stick (*chen*) over the back of the figure. The drums are built in all sizes, and occupy a position of importance, for the chief purpose of Chinese music is to make as much noise as possible. As everything else, the number of instruments, of singers, etc., is strictly regulated by laws. According to the importance of the occasion, the number of performers may vary from two mandarins, two singers, and twelve instrumentalists to as many as thirteen mandarins, four singers, and fifty-two instrumentalists. The actual Chinese melodies are devoid of all artistic sense; there is no rhythm, no symmetry, no melody. Most of the airs illustrate the conservatism of China by the fact that the tones B and E, which were wanting in the oldest scale, are almost always avoided. For full information the reader is referred to Ambros, *Geschichte der Musik*, Vol. I. (Leipzig, 1880); Roussier, *Notes et observations sur le mémoire du P. Amiot concernant la musique des Chinois* (Paris, 1779).

CHINESE WALL. A wall once 1250 miles long, extending between Mongolia and China proper from Suchau, in Kiang-su, eastward to the Gulf of Pe-chi-li, with an extension northeastward to the Sungari River. It is called in Mongolian the White Wall, in Chinese the wall of 10,000 Li, and is the most gigantic defensive work in the world. In the Third Century B.C. an earthwork against the incursions of the Tatars was thrown up which in parts corresponds with the present wall. The latter, however, as recent researches indicate, dates only from the latter part of the

Fourteenth Century. Since the accession of the Manchu Dynasty in 1644, the wall has been allowed to fall into decay, except at a few points where it is maintained for customs purposes. The wall is 35 feet high, 21 feet thick, and is faced with granite blocks, with towers at frequent intervals. Its course is irregular, but chosen without regard to natural obstacles.

CHINESE WHITE. The white oxide of zinc recently introduced into the arts under this name, as a pigment in place of the preparations of white lead. It changes very little either by atmospheric action, or by mixing with other pigments; but it has not the body of white lead. It is prepared also for use in water-color painting, and when so employed is known as body color (q.v.). It renders water-colors less transparent when mixed freely with them, but is very useful when sketching on tinted paper, as by its means, quick results and sharp effects may be obtained.

CHIN-FLY. A bot (*Gastrophilus nasalis*), smaller than the horse-bot (*Gastrophilus equi*), densely hairy and with the thorax rust-colored, troublesome to equine animals in the southern United States. "The eggs are laid on the lips or nostrils within easy reach of the tongue. . . Measures of prevention must consist in preventing as far as possible the deposition of the eggs, for which purpose the application of a little tar and fish-oil to the hairs of the under lip may be of service, and where eggs are suspected the use of a wash of carbolic acid to the lips and the margin of nostrils." See BOT.

CHINGACHGOOK. An Indian chief, who plays a prominent part in Cooper's *Last of the Mohicans, Pathfinder, Deerslayer,* and *Pioneer.*

CHING-HAI. A fortified seaport in the Chinese Province of Che-Kiang, situated at the mouth of the river Yung, about 18 miles from Ning-po (q.v.), of which it is the seaport. It has a citadel and an estimated population of over 140,000. It was taken by the British in 1841.

CHING-TU, chĭng-tōō'. A Chinese city, capital of the Province of Sze-chuen, situated on the River Min, in the midst of a fertile plain (one of the largest in the empire), and a rich mining region. Famous in Marco Polo's time, it is still one of the richest cities in the empire, with clean streets and canals, carrying on a flourishing trade with the cities of the Yang-tse River Valley. It has telegraphic connection with Hankow. In the arsenal, which has machinery of German and British make, rifles and cartridges of the Mauser pattern are turned out. It has a population of nearly a million.

CHINIQUY, shê'nê'kê', CHARLES PASCAL TELESPHORE (1809-99). A Canadian preacher. He was born at Kamouraska, Province of Quebec, ordained in 1833 as a Roman Catholic priest, and after having had charge of several parishes, started his successful temperance crusade (1846). In 1851 he established at Kankakee, Ill., an extensive Roman Catholic colony. He became a Presbyterian minister in 1858, and thenceforth spent much time in public addresses against the Roman Catholic Church, and published a number of works, largely controversial, of which the principal was *Fifty Years in the Church of Rome* (1886).

CHINKARA, chĭn-kä'rȧ (from Skt. *chikkāra*, sort of antelope). The Indian gazelle (*Gazella Bennetti*), sometimes improperly called 'ravine-deer.' See GAZELLE.

CHIN-KIANG-FU, chĕn'kyäng'fōō'. A city and port in China, named Rule-the-River City, because of its former military importance. It is situated at the junction of the Grand Canal, on the right bank of the Yang-tse-kiang, about 150 miles from its mouth. The population is 140,000. It was opened to commerce by the Treaty of Tien-tsin (1858). Waterways connect it with Shanghai. It has a bund or river-fronting esplanade, clubhouse, and churches. In 1889 a native mob destroyed half the foreign houses. Nearly destroyed by the Tai-ping rebels, who occupied it from 1853 to 1857, it has fully regained its commercial importance. Goat-skins, silk, rice, hides, wool, and fancy products are exported, and opium, cotton goods, and sugar are imported. In 1897 the total trade amounted to $17,000,000, and the tonnage of shipping 3,555,739, of which 2,353,702 was British.

CHIN'NERY-HAL'DANE, JAMES ROBERT ALEXANDER, Lord Bishop of Argyll and the Isles. See ARGYLL AND THE ISLES.

CHINON, shē'nôɴ' (anciently called *Caino*, probably connected with OIr. *cáin*, OWelsh *cein*, beautiful, Gk. *καίνσθαι*, *kainsthai*, to surpass, Alban. *si*, eye). A town of France in the Department of Indre-et-Loire, situated on the Vienne, 25 miles southwest of Tours (Map: France, G 4). It has the remains of a huge old castle, the occasional residence of the Plantagenet kings of England, and also of some of the French sovereigns. It is celebrated as the birthplace of Rabelais, and as the meeting place of Jeanne d'Arc and Charles VII. in 1429, both events being commemorated by monuments. Chinon has manufactures of druggets, serges, earthenware, etc. Population in 1901, of town, 4183; of commune, 6033.

CHINOOK, chĭ-nook'. Formerly an important tribe occupying the country at the mouth of the Columbia River, on the north bank, in Washington. They were venturesome fishermen and enterprising traders, traveling long distances up the river and along the coast in great canoes hewn from immense cedar trunks. They lived in houses made from cedar boards, flattened the head, owned slaves, and practiced the potlatch (q.v.). Cognate tribes held both banks of the Columbia as far up as the Dalles. The tribe has dwindled to extinction, but its language forms the basis of the noted Chinook jargon (q.v.).

CHINOOK. A term applied by the early settlers of the Northwest Territory and in meteorological literature to a strong warm and dry south or west wind descending the eastern slopes of the Rocky Mountains into Montana and Wyoming, evaporating or melting the snow and bringing great relief in cold weather. The name was probably given to it because the wind occurred in, or blew from, the territory occupied by the Chinook Indians. It was at first supposed by the settlers to be a branch of the warm southwest wind of the Pacific Ocean that had crossed over the Rocky Mountain range; indeed, the moist southwest winds on the coasts of Oregon and Washington have also been called chinook winds. It is a mistake to think that the Montana chinook originates over the warm waters of the Pacific; it is essentially a descending wind and owes its temperature and dryness to this fact;

it belongs to the same class as the Föhn winds of Switzerland. Several very different combinations of conditions may cause descending winds, but in any case descending air by coming under greater pressure must be compressed and therefore warmed up at the rate of about 1° Fahrenheit for each 183 feet of descent, or 1° Centigrade per 100 meters. Therefore a fall of 5500 feet, such as is very common in flowing over the Rockies, will raise the temperature of the air by 30° Fahrenheit, and as this warmth is very slowly lost, the warm air spreads over a wide extent of ground. The hot winds of Kansas and Iowa undoubtedly also owe their high temperatures to the fact that the air is descending rapidly. As no moisture is added to the mass of descending air, the Föhn winds of Switzerland, the chinooks of Montana, and especially the hot winds of Kansas are extremely dry, and evaporate and absorb any snow or moisture at the surface of the ground. The proper explanation of chinooks was first given by G. M. Dawson, 1879-1880, but the most important early paper on the subject was by Professor Mark W. Harrington of the University of Michigan, in the *American Meteorological Journal*, Vol. III. (Ann Arbor, 1887).

CHINOOK JARGON. An important trade jargon constituting the chief medium of intercommunication among all the tribes of the Pacific Coast from northern California far up into Alaska, and throughout the Columbia region. Owing to its great usefulness over a wide area, considerable attention has been given to it by traders and missionaries, despite its mongrel and skeleton character. According to an analysis of 500 words, two-fifths are of Chinook origin, two-fifths from other Indian languages and Canadian French, and one-fifth from the English, all, however, being softened and modified to suit the phonetic deficiencies of those using the jargon. Consult: Hale, *Manual of Oregon Trade Language* (London, 1890); Gill, *Dictionary of Chinook Jargon* (Portland, Ore., 1891); Boas, "Chinook Texts," in *Smithsonian Bureau of Ethnology* (Washington, 1894); Pilling, "Bibliography of Chinook Languages," in *Smithsonian Bureau of Ethnology* (Washington, 1893).

CHINOOK SALMON. The common and most valuable salmon of the Pacific Coast. See QUINNAT SALMON and SALMON.

CHINS. A general name applied to certain peoples of a more or less primitive type inhabiting the mountains of Assam, Arakan, the Burmo-Chinese frontier, etc., known variously as Chins, Kakhyens, Khyens, Katchins, or Singhpos. Physically they are now somewhat mixed with the other peoples of this area, Karens, Burmese, and Shans, with perhaps a later Hindu and an earlier Dravidian strain, the whole resting upon a Mongoloid (Sinitic) basis. Some of the Chins are very warlike, and great hunters. By language they seem to belong in the Tibeto-Chinese stock, being nearest related to the Burmese. Besides the general works on Assam, Burma, etc., the literature relating to the Chins includes Anderson, *Mandalay and Momien* (London, 1876), and Reid, *Chin-Lushai Land* (London, 1893). The Chins of Dardistan belong to another race altogether, and speak an Aryan tongue.

CHINSURA, chĭn-sōō'rȧ. A former town in Bengal, British India, on the right bank of the Hugli, 20 miles above Calcutta, now incorporated with Hugli (q.v.) (Map: India, E 4). Chinsura was originally the chief Dutch settlement in Bengal, and was established in 1656. It was ceded in 1824 to the British, together with other places on the mainland, in exchange for the English possessions in the island of Sumatra.

CHINTREUIL, shăN'trē'y', ANTOINE (1816-73). A French painter, born at Pont-de-Vaux (Ain). His landscapes have assured him a position among modern artists. Somewhat in the manner of Corot he painted "Effet de crépuscule" (1848), "La mare aux pommiers" (1850), "Après la pluie," "Pluie et soleil," and "Marée basse," his best picture.

CHINTZ (Hind. *cīnt*, *cīt*, Beng. *cit*, chintz, from Skt. *chitra*, spotted, variegated). A highly glazed printed calico, with a pattern in many colors on a white or light-colored ground. It is chiefly used for bed-hangings, for covering furniture, and other purposes where gay colors are desired, and where there is much exposure to dust, which does not adhere to its highly calendered surface. See CRETONNE.

CHIO, kē'ō. See CHIOS.

CHIOGGIA, kyŏ'jȧ, or **CHIOZZA**, -dzȧ (mediæval *Clugia*, from Lat. *Fossa Clodia*). An episcopal city and fortified seaport of Italy, 18 miles south of Venice (to which there are frequent daily steamboats), and 63 miles by rail southeast of Padua (Map: Italy, G 2). It is built on piles, is surrounded by the Lombardo Ship Canal, is cut in two by the Vena Canal, which is crossed by nine bridges, and is connected with the mainland by a stone bridge nearly 800 feet long, with 43 arches. The cathedral dates from 1633, the Board of Trade building from 1322. The inhabitants have always been distinguished by quaint customs, costumes, and dialect, and the fisheries have long been important. The other principal industries are flax-spinning, ship-building, and the manufacture of sails, bricks, candles, and lace. The rivalry of Genoa and Venice was decided here, December 23, 1379, by the victory of the Venetian fleet. Population, in 1881 (commune), 28,000; in 1901, 30,563.

CHION, kī'ŏn (Lat., from Gk. Χίων). A native of Heraclea, on the Euxine Sea, son of Matris and pupil of Plato. In conjunction with Leonides and others, he tried, in B.C. 352, to liberate his native city from the tyranny of Clearchus. Clearchus was killed, but his brother, Satyrus, brought about the death of Chion, and reasserted the tyranny. There are extant seventeen letters, which purport to have been written by Chion, but are spurious.

CHIONIDES, kī-ŏn'ĭ-dēz (from Gk. *Χιωνίδης*). A Greek comic poet, whose representations date from B.C. 487. He is called the earliest writer of the old Athenian comedy, in that he was the first to impart to it that spirit of censorious criticism, whether of morals, politics, or literary taste, which distinguished it down to the time of Artaphernes. The extant fragments of his works have been edited in Meineke, *Fragmenta Comicorum Græcorum* (Paris, 1839-57), and Kock, *Comicorum Atticorum Fragmenta*, Vol. I., 4-7 (Leipzig, 1880-84).

CHIOS, kī'ŏs (Gk. *Χίος*, *Χῖος*, *Kios*, Turk. *Saqis adásch*; *Scio* in the Genoese form). A Turkish island seven miles off the west coast of Asia Minor, and about 50 miles in a direct line west of Smyrna. Its length from north to south is 32 miles; its greatest breadth is 18; area, about 400 square miles. Chios is consequently one of the largest islands in the Ægean Sea, and is, or was, until the terrible earthquake of 1881, one of the most productive and beautiful, the name having furnished in ancient times a synonym for wealth and profligacy. The surface is largely occupied by chalky limestone mountains, which in the north reach an altitude of 4080 feet in Mount Oros. Along the centre of the east coast lies the most extensive plain, around the capital, Chios. It is a rich and picturesque district, abounding in vines and orange, lemon, and almond trees, and embellished with villas. The climate is dry, especially in summer, and delightful. The wine of Chios, famous in antiquity, is still of some repute. Oil, cotton, and the usual fruits of that latitude are produced, and in the southwestern part a well-known variety of mastic. Cheese, silk, wool, and silk and woolen stuffs, as well as grain, cattle, salt, and preserved fruits, figure prominently among the products. The leading export articles are leather ($3,120,000 in 1899), mastic, fruits, and distilled spirits. The leading import are hides ($1,920,000 in 1899) and grain ($720,000). Chios belongs to the Turkish vilayet Dschesairi-Bahri-Sefid, and has a population of 59,600, mostly Greeks. The population of the capital was 13,000 before the disaster of 1881. The city has an Aga, a bishop of the Greek Church, and is, with its new haven, protected by a fortress. In 1899, 1299 ships of 689,683 tons entered here.

In early times the island was colonized by the Ionians, and remained an independent and powerful State till B.C. 546, when it was subdued by the Persians. It took part in the Ionian revolt, and contributed 100 vessels to the Greek naval force which was defeated at the battle of Lade (B.C. 494). From that time until B.C. 479 it was again subject to the Persians, but in the latter year it was freed from the Persian yoke, and became in B.C. 477 an independent member of the Delian Confederacy. In B.C. 415 it took part in the Sicilian expedition with fifty ships. The island remained on its original footing of autonomous ally of Athens, retaining its armed force, its ships, and its fortifications, until B.C. 412, when it attempted to revolt—an attempt which led in the end to its conquest and devastation. In more recent times the island has changed hands repeatedly, and has experienced many vicissitudes of fortune. In 1089 it was devastated by the Turks under Tzachas. In 1172 it was in the possession of the Doge of Venice, Vital Michieli. In 1346 it fell into the hands of the Genoese, and in 1566 it was taken by the Turks, in whose hands it has since, except for a short interval (1694-95), remained. It was conferred as private property upon the Sultana, enjoyed her protection, and consequently prospered. In 1822 a number of the Sciotes having joined the Samians in a revolt against Turkey, the island was attacked by a Turkish fleet and army, and the inhabitants were mercilessly slaughtered or sold as slaves. The town and island were laid waste. The island has since recovered, however, and is now in a prosperous condition. In recent years the island has suffered from earthquakes, notably in March, 1881, when much property was destroyed and many people lost their lives.

CHIP'MAN, Nathaniel (1752-1843). An American jurist and politician. He was born in Salisbury, Conn.; graduated at Yale in 1777; served as a lieutenant in the Revolutionary Army, and was present at the battles of White Plains and Monmouth. He was admitted to the bar in 1779, and began practice in Vermont, where he became Chief Justice of the State court in 1789. In 1791 he was a member of the convention called to decide whether Vermont should join the Union, and was one of the commissioners to arrange for the State's admission. Washington appointed him judge of the United States Court for the district of Vermont. In 1797 he was chosen United States Senator, and in 1813 was again elected Chief Justice of the State. He was afterwards, for twenty-seven years, professor of law in Middlebury College. He published *Principles of Government: A Treatise on Free Institutions* (1833), and other works of a similar character.

CHIPMAN, Ward (1787-1851). A Canadian jurist, born in Saint John, New Brunswick. He was educated there and at Harvard, and was appointed Crown agent for determining the northwest angle of Nova Scotia. He was also successively Advocate-General, clerk of the circuits, and Solicitor-General. In 1825 he was appointed puisne judge of the Supreme Court, and in 1834 became Chief Justice. He was, besides, president of the Legislative Council and Speaker of the Assembly.

CHIPMUNK (N. Amer. Indian, probably originally imitative). An American ground-squirrel of the genus Tamias, which forms a connecting link between the arboreal squirrels proper and the spermophiles. It is a small animal, about 6 inches long, with a slender four-inch tail. The color is reddish brown or gray, with black and white stripes on the back. The chipmunk (*Tamias striatus*) is one of the commonest and most pleasantly familiar animals in eastern North America, living in stone walls and stumps. It is almost always to be found along old fences and hedgerows, especially near woods, and lives in a burrow, wherein it stores for winter use large quantities of small nuts, acorns, etc., and where it remains in a snug nest until spring, frequently appearing, however, on the warmer days. Other species occur in the central and western United States, of which the 'four-lined' is extremely numerous and active throughout the whole Rocky Mountain region. (See Plate of Squirrels.) For systematic review of the genus, consult J. A. Allen, *American Museum of Natural History Bulletin*, Vol. III. (New York, 1890).

CHIPPAWA, chĭp'ȧ-wä. A village and port of entry in Ontario, Canada, at the junction of the Chippawa with the Niagara River, 2 miles above the great falls (Map: Ontario, D 4). An electric railway running from Queenston, past the falls, terminates at Chippawa. Here Major-Gen. Joseph Brown, July 5, 1814, with 1900 Americans, of whom 68 were killed and 267 wounded, defeated the English under Major-General Rial, who had 2100 men, of whom 138 were killed and 365 wounded. Population, 500.

CHIP'PENDALE, Thomas. A well-known English cabinet-maker of the Eighteenth Century. Little is known of his life, except that he was active in his trade about 1760. He markedly influenced the construction of furniture in England in his day. Consult Litchfield, *Illustrated History of Furniture* (London, 1892).

CHIPPENDALE FURNITURE. A particular style of light and elegant drawing-room furniture, inlaid with colored woods, and first made by Thomas Chippendale. Almost all mahogany furniture of the Eighteenth Century is popularly known as Chippendale. Chippendale's designs are delicate and elaborate, though perhaps somewhat overwrought. In 1752 he published a book of designs for furniture drawn by himself. Of this work a second edition appeared in 1759, and a third in 1762. John Weale (London, 1849) issued an elaborate volume entitled *Chippendale's Designs for Sconces, Chimneys, and Looking-glass Frames in the Old French Style.* See FURNITURE.

CHIP'PENHAM. A market town in Wiltshire, England, on the Avon, 22 miles east of Bristol (Map: England, D 5). Chippenham is famed for its markets of cheese and corn, its cheese market being one of the largest in Britain. There is also a large condensed-milk factory. Population, in 1901, 5000. Near the town is Lacock Abbey. It was the scene of the signing of the famous Treaty of Chippenham, or Wedmore, in 878, between King Alfred the Great and the Danish leader Guthrum.

CHIPPEWA, chĭp'pê-wä. See OJIBWA.

CHIPPEWA FALLS. A city and county-seat of Chippewa County, Wis., about 100 miles east of Saint Paul, Minn., on the Chippewa River, and on the Chicago, Milwaukee and Saint Paul, the Chicago, Saint Paul, Minneapolis and Omaha, and the Wisconsin Central railroads (Map: Wisconsin, B 4). It possesses a public library and a fine county court-house. The State Home for the Feeble-minded and the County Insane Asylum are located here. Tone Rock battleground, near by, is of interest as the scene of a Sioux-Ojibwa conflict. The city has fine water-power, and important manufactures of lumber, wooden-ware, flour, shoes, gloves, beer, woolen goods, foundry products, etc. Settled in 1838, Chippewa Falls was chartered as a city in 1870. The government is administered, under a revised charter of 1885, by a mayor, elected biennially, and a municipal council. Population, in 1890, 8670; in 1900, 8094.

CHIPPEWA RIVER. A river of Wisconsin, rising in the northern part of the State, about 30 miles southeast of Ashland, on Lake Superior (Map: Wisconsin, B 3). It flows southwest, meeting its west branch in Sawyer County, and, receiving the Flambeau from the east and the Red Cedar from the west, empties into the Mississippi River at the lower end of Lake Pepin. It falls a distance of about 500 feet in the 200 miles of its course, and flows through the great lumber region of the State. At Chippewa Falls there is available a large amount of water-power.

CHIP'PEWY'AN. A nomadic hunting tribe of Athabascan stock, roaming over the country along Great Slave River from Lake Athabasca to Great Slave Lake. They are said to have lived formerly much farther to the southeast, until driven out by the Cree, after the latter had procured guns from the traders. The name, which must not be confounded with Chippewa or Ojibwa (q.v.), is of Cree origin, and signifies 'pointed coat,' referring to a characteristic fur garment worn by the men. They are also frequently known as Athabasca, from the lake near which they reside. They number about 1000, all now Christianized by Catholic missionaries.

CHIP'PING WYCOMBE, wĭk'am. See WYCOMBE.

CHIPPY, or CHIPPING-BIRD (so called from its note). One of the smallest and most numerous of the migratory American sparrows (*Spizella socialis*), distinguished by its small size, unspotted, ashy-blue breast, and chestnut cap. It is a general favorite, because of its gentle manners and familiarity. It builds its nest in shrubs, of grass and fine roots, and always lines it with horse-hairs, whence it is sometimes called 'hair-bird.' The eggs are four or five in number, blue, speckled at the larger end with blackish brown. Two or three broods are reared in a season. (For illustration, see SPARROW.) Like other sparrows, the chippy feeds chiefly on seeds, but it often eats insects too. It is by no means a songster, but the usual *chippy-chippy-chippy* forms a trill that is musical and sweet. Consult Weed, "Feeding Habits of the Chipping Sparrow," *New Hampshire College Agricultural Experiment Station Bulletin 55* (Durham, 1898), from which it appears that the bird does good service for the gardener as a destroyer of insects, and should be protected and encouraged. See SPARROW.

CHIQUICHIQUI (chē'kê-chē'kê) **PALM** (So. Amer. Indian). A palm (*Leopoldinia piassaba*) called piassaba in northern Brazil. It is one of the species yielding piassaba fibre, which is employed in the manufacture of brushes. The piassaba fibre exported from Pará is partly obtained from it. It grows in swampy or occasionally flooded lands, on the banks of the Rio Negro and other rivers of Venezuela and the north of Brazil, and has a crown of very large, regularly pinnate leaves, with smooth, slender stalks. The leaves, like those of many other palms, are much used for thatching.

CHIQUINQUIRÁ, chê-kēn'kê-rä'. A city in the Department of Boyacá, Colombia, situated 44 miles west of Tunja, and 8600 feet above sea-level (Map: Colombia, C 2). The town is famed for its chapel having a miraculous picture of the Virgin. The chapel is visited annually by some 30,000 pilgrims, which number swells to 50,000 every seventh year, the time of public celebration. The permanent population is about 13,000.

CHIQUITO, chê-kē'tô (Sp., very small). A group of tribes constituting a distinct stock, between the headwaters of the Mamoré and the Paraguay, eastern Bolivia. They are of small stature, whence the name, and were originally agricultural, but warlike, living in palisaded villages with houses regularly ranged in streets. They resisted the Spaniards for nearly two centuries, but in 1691 accepted the Jesuit missionaries, who established flourishing mission communities among them, selecting the Chiquito language proper as the general medium of communication among the converts, who numbered over 50,000, representing nearly fifty tribes. On the expulsion of the Jesuits in 1767, the communities rapidly decayed, and within a generation nearly two-thirds of the Chiquito race had disappeared. A considerable body still survives, living in straw-thatched adobe houses, cultivating cotton and sugar-cane and weaving ponchos and hammocks.

CHIR'IMOY'A. See Cherimoyer.

CHIROGALE, kī'rô-găl (from Gk. χείρ, *cheir*, hand + γαλῆ, *galē*, weasel). A genus (Chirogaleus) of small arboreal lemurs of Madagascar, which have the interesting habit of curling up in holes of trees and passing the dry season in a state of torpidity. "Before this takes place an immense deposit of fat accumulates upon certain parts of the body, especially upon the basal portion of the tail, . . . which by the time they emerge from their torpor has acquired its normal proportions. The smallest species . . . live among the small branches on the tops of the highest trees, feeding on fruit and insects, and making nests which resemble those of birds." Lydekker, *Mammals* (London, 1891).

CHIROLEPIS, kī-rŏl'ê-pĭs (Neo-Lat., from Gk. χείρ, *cheir*, hand + λεπίς, *lepis*, scale). The earliest known ray-finned fish, found in the Devonian rocks of Europe and North America. The body was slender, about 20 inches in length, and was covered by the regular rhomboidal ganoid scales, which in this genus were very small, and reinforced on their inner surfaces by vertical ridges. The skull had almost the normal development of external bones, and the jaws were strong and well provided with teeth. The fins, which had very finely divided rays, consisted of a pair of pectoral, a pair of pelvic, and an anal and dorsal fin, and the tail was heterocercal. Chirolepis is a member of a heterogeneous family of fishes, the Palæoniscidæ, that apparently gave rise to two widely divergent evolutional series — namely, to the progressive series of the teleosts on one hand, and on the other hand to the regressive or degenerate series terminating in the modern sturgeon. See Sturgeon; Palæoniscus.

CHIROMANCY, kī'rô-măn'sĭ (from Gk. χείρ, *cheir*, hand + μαντεία, *manteia*, divination), or Palmistry. The art of divination through the study of the palm of the hand. The interpretative science of the hand in general is termed chirosophy. It is divided into two branches—chirognomy, which is concerned with studying man's tendencies through the form of the hand and the fingers, and chiromancy, which pretends to foretell by inspecting the lines of the palm. Chiromancy is an ancient art which was known among the Chaldeans, Assyrians, Egyptians, and Hebrews, and was cultivated by the philosophers Plato, Aristotle, Antiochus, Ptolemy, and others. Aristotle found on an altar dedicated to Apollo a treatise on chiromancy, written in letters of gold, and presented it to Alexander the Great as a gift worthy of his lofty mind. References to the subject are in Aristotle's *Hist. Animalium* (i. 15), and in the *Problemata* and *Physiognomica*, doubtfully assigned to him. A reference in Juvenal (Sat. vi. 581) is evidence that the art was practiced among the Romans. That chiromancy was practiced and accepted seriously in the Middle Ages we know from frequent references to it in writings of that period. Albertus Magnus, Paracelsus, and Cardanus seem to have been greatly interested in the subject. Later it became involved in jugglery, until in the Nineteenth Century it again received a certain amount of serious consideration, largely owing to the work of two Frenchmen—Adrien Adolphe Desbarrolles (1801-76) and Casimir Stanislas d'Arpentigny (born 1798), an officer in the French Army.

Palmistry treats mainly of the mounts of the hand, with the lines on them and the lines interlacing the palm. The left hand is usually the one studied, since it is less affected by use. There are seven mounts—that at the base of the first finger is the mount of Jupiter; the middle finger, the mount of Saturn; the ring finger, the mount of Apollo; the little finger the mount of Mercury; beneath Mercury the mount of Mars; at the wrist, the mount of the Moon; and at the thumb, the mount of Venus. More important even than the mounts are the four great lines—the line of life, of the head, of the heart, and of fortune. The three first named suggest the letter M, and represent the trinity of human existence—sensation, intelligence, and action. The line of life, which follows the mount of Venus and meets the line of the head, determines the length of life, possibility of illness, etc. The line of the head, which crosses the palm obliquely from Jupiter to Mars, indicates the intellectual quality. The line of the heart, which crosses the hand horizontally from Jupiter to Mercury, indicates worth of character; the nearer the line approaches Jupiter the better the character. The line of fortune, which cuts the hand vertically, if clear and straight foretells a prosperous life. Other lines of special interest are the Venus line, the line of the liver, and line of Apollo. In general, the lines indicate the strength or weakness of tendencies, according to their length and clearness.

Each mount indicates a certain quality; an absence of the mount, an absence of the quality. Jupiter normally developed indicates love of honor and a happy disposition; Saturn, prudence and wisdom, and therefore success; Apollo, a love of the beautiful and noble aspirations; Mercury, a love of science, industry, and commerce; Mars, courage and resolution; the Moon, a dreamy disposition and morality; Venus, a taste for beauty and a loving temperament. Beside the mounts and the lines are squares, stars, circles, points, triangles, crosses, rings, branches, chains, forks, islands, etc., which corroborate or modify according to their situation the indications deduced from the inspection of the mounts, the lines, and the form of the hand and the nails.

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CHIRON, kī'rŏn (Lat., from Gk. Χείρων, *Cheirōn*). The most famous of the Centaurs (q.v.), the son of Cronus and Philyra. He is distinguished from the other Centaurs by his mildness and wisdom, and the general benevolence of his character. Often represented in works of art, these attributes of his are evident in a nobler and more human bearing. Many Greek heroes were befriended and educated by Chiron, among others Achilles, Actæon, Alcon, and even Apollo. He was acquainted with the art of healing, and was considered the inventor of the lyre.

CHIROPTERA, kī-rŏp'tē-rȧ (Neo-Lat. nom. pl., from Gk. χείρ, *cheir*, hand + πτερόν, *pteron*, wing). An order of mammals, the bats, characterized by the possession of membranous wings (*patagia*) supported upon the highly modified bones of all limbs, and extended by the greatly prolonged metacarpals and phalanges of the *manus*. (For details, see Bat.) This order is regarded as an ancient offshoot of the Insectivora, to which it is allied in dentition and many features of internal structure; it is also allied to the Primates in dental characters, and especially in the structure and external characteristics of the generative organs. Hence it is usually classified in a linear arrangement next to the Insectivora. It is divided into two suborders—*Frugivorous Megachiroptera*, or fruit-eaters, and *Animalivorous Microchiroptera*, or insect-eaters. Geologically the history of the order begins in the Eocene Age.

CHI'ROTHE'RIUM. See Cheirotherium.

CHIR PHEASANT, chēr fĕz'ant. A crested pheasant (*Catreus Wallichi*) of the middle ranges of the Himalaya, which varies from the true pheasants in lacking the bright metallic plumage, and in other details.

CHI'RU (Hind., from Tibetan). An antelope (*Panthalops Hodgsoni*) inhabiting the pine forests and elevated plains of Tibet. It is about 32 inches in height, pale fawn in color, with a black face in the bucks, and these alone have long, gazelle-like horns. They sometimes gather in autumn into great herds, and always tax the stalker's patience by their watchfulness.

CHISELHURST, chĭz''l-hẽrst, or **CHISLEHURST**. A parish in Kent, England, 11 miles southeast of London. It was here, at Camden House, that the exiled Napoleon III. fixed his residence in 1871, and died January 9, 1873. Chiselhurst remained the residence of the Empress Eugénie until 1880. Population, in 1901, 7400.

CHISELMOUTH. A large, blackish chub (*Acrocheilus alutaceus*) of the Columbia River, also called 'hardmouth' and 'squaremouth,' in reference to the blunt, fleshy mouth, the lower lip of which is covered with a firm, sharp-edged cartilaginous plate. It is occasionally eaten.

CHISHOLM, chĭz'om, Mrs. Caroline (Jones) (1808-77). An English philanthropist. She established at Madras an industrial school for the daughters of poor soldiers, and in 1838 went with her husband to Australia. She founded at Sydney homes for the reception of female colonists, and aided many wives and children of liberated convicts to leave England and join their husbands and parents, establishing therefor the Family Colonization Loan Society.

CHISHOLM, William Wallace (1830-77). An American official, born in Morgan County, Ga. As a Union sympathizer he was elected sheriff by the negroes after the war, and reëlected in 1873. He proved himself an able leader, and succeeded in making the county the chief rallying point of the Republican Party in the State. He was arrested in the spring of 1877, on the charge of having murdered John W. Gully, a Democratic leader, who had been shot near Chisholm's dwelling. His family, consisting of his wife, three sons, and a daughter, voluntarily accompanied him to jail. On the morning following his arrest the doors of the jail were demolished by the mob, which probably consisted largely of members of the Ku-Klux Klan. Chisholm's son, a boy of thirteen, was shot; a daughter of eighteen mortally wounded; and Chisholm himself was fatally injured. As no evidence of complicity in the murder of Gully existed against Chisholm, the origin of the massacre has been traced to the fact that, being in a position to control the favor of the Republican Party, Chisholm had incurred the animosity of the Democrats of the district, who refused to accept the existing conditions. The episode of Chisholm's death suggested a very powerful chapter in Tourgée's *A Fool's Errand*.

CHISHOLM vs. **GEORGIA**. A noteworthy case decided by the Supreme Court of the United States in 1793, and reported in 2 Dallas Reports, 419. In 1792 Alexander Chisholm, a citizen of South Carolina, sued the State of Georgia in the Federal courts, but the State refused to make an appearance in the suit. The Supreme Court, when the case came before it, took occasion to review the origin and nature of the Union, and decided that a State could properly be made a party defendant to such a suit under the grant to the Federal courts, in the Constitution, of judicial power over cases "between a State and citizens of another State." The agitation incident to such a decision, apparently invading the 'sovereignty' of each State, led shortly thereafter to the adoption of the eleventh amendment to the Constitution, providing that the Federal judicial power should not extend to any suit brought against a State by a citizen of another State or of a foreign State. Later, efforts were made to circumvent this prohibition by a citizen assigning his claim to the State of his domicile, and by then having the suit brought in the name of the assignee State; but it was held that this could not be done, in *New York* vs. *Louisiana*, 108 United States Reports, 76.

CHISTOPOL, chē'stō-pōl'. See Tschistopol.

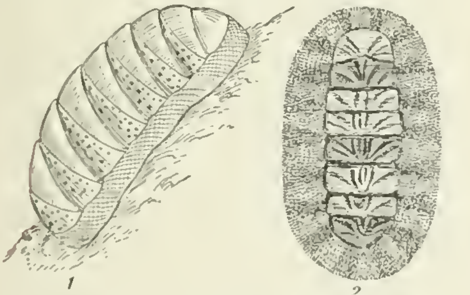
CHISWICK, chĭz'ĭk (sandy bay). A suburb of London, seven miles west-southwest of Saint Paul's, on the left bank of the Thames. Around Chiswick are many fine villas, extensive market gardens for supplying London, and the gardens of the London Horticultural Society. The churchyard contains the grave of Hogarth. The Duke of Devonshire's beautiful villa, Chiswick House, is situated here. Population, in 1901, 29,800.

CHITAL, chē'tŭl, or **CHITRA**, chē'trȧ. The axis-deer. See Axis.

CHITIN, kī'tĭn (from Gk. χιτών, *chitōn*, tunic). The chief chemical constituent of the skeleton of insects and crustaceans. It differs from the horn substance by being insoluble in alkalies. It may be prepared from the body of articulata by extracting with dilute hydrochloric acid and alkali, then boiling with water, alcohol, and ether. When pure, it is a white, amorphous substance usually retaining the skeleton form. Its exact chemical composition is unknown. Boiling concentrated acids transform it chiefly into glucosamine, $C_6H_{13}NO_5$.

CHITON, kī′tŏn (Lat., from Gk. χιτών, Ionic **κιθών**, *kithōn*, probably a loan-word from Heb. *kētōneth*, coat). In ancient Greece, a sort of shirt or undergarment, worn next the skin by both men and women. In Homeric times it was worn by men alone, the *peplos* being the women's underdress of this period. The Homeric chiton was a close-fitting garment of linen, which, being closed at the sides, was drawn on over the head, while the peplos was a long, loose woolen garment, open at one side and fastened with a brooch at the shoulder. In later times the chiton came into use for both sexes, and was of two general forms. That of the men resembled the earlier Homeric chiton, being a short, close-fitting garment, sewed at the sides and provided with short sleeves or mere armholes; while that of the women, the so-called Ionic chiton, was long and loose, and was sewed at the sides and provided with sleeves. The earlier peplos, however, was still used, being especially favored by the Spartan women, whence it received the name of *Dorian*. Later still there came into use a sleeveless chiton for women. The chiton was sometimes worn girded and sometimes not, and it was of various colors and cuts. Consult Amelung, in Pauly-Wissova, *Real-encyklopädie*.

CHITON. A group of mollusks, the mail-shells, constituting an order (Placophora) in the class Amphineura. The shell is composed of eight narrow, transverse, calcareous pieces, overlapping each other in a row along the back, and strongly attached to the mantle, which is remarkably fleshy and fibrous. Chitons have the power of rolling themselves up into a ball like the armadillo (q.v.), thus exposing nothing but the hard shell. The organ of locomotion is an oval foot, extending the whole length of the animal, by means of which chitons cling to rocks so tenaciously that the heaviest surf does not disturb them. More than 200 species are known; they dwell in all climates, but are most abundant in the warmer seas. They occur at all depths, but prefer the rocks along the shore, where they sometimes are found in surprising numbers. All North Atlantic species are small, seldom an inch in length, but some of those found in the tropics, and on the coast of California, may be 8 or 10 inches long. Most of the chitons are gray or brown in color, but some species are very handsomely marked with red, orange, yellow, green, and other colors. The upper surface may be comparatively rough, with papillæ and spines. In most cases it is nearly covered by the shell plates, but in one or two genera the plates are very narrow, and cover only the mid-dorsal part of the animal, while in still others the plates are completely concealed within the thickened integument. "West Indian negroes" are said to "eat the large chitons, which are abundant on their rocky coasts, cutting off and swallowing raw the fleshy foot, which they call beef."



CHITON, OR MAIL-SHELL.

1, attitude in life; 2, detail of shell and integument, dorsal view.

Fossil Forms. The modern chitons are the survivors of a long line of ancestors that made their first appearance in the Ordovician or Lower Silurian rocks, attained some prominence during Carboniferous time, and, with a slight decline during the Tertiary period, have continued with only slight changes of scarcely more than generic rank down to the present era. The group thus affords an excellent example of the persistence of a generalized primitive type. The fossil genera are classified according to the form of the articulating facets of the valves and the proportions of the shell and its segments. See also Placophora.

CHITRALI, chē-trä′lē. The natives of Chitral, a region on the borders of British India, northeast of Kafiristan, on the southeastern slope of the Hindu-Kush. They belong, with the Kafirs (Siahposh), physically to the white race and linguistically to the Aryan stock. Their number is estimated at between 150,000 and 200,000. In the last years of the Nineteenth Century they came into conflict with the English authorities, and their ruler, the Mehtar, is now a British vassal. An interesting account of this people and their neighbors is given in Sir George Robertson, *Chitral* (London, 1898).

CHIT′TAGONG′ (corrupted from *Chatgoan*), or Islamabad (city of Islam). (The second name was conferred by Aurungzebe, who captured it toward the close of the Seventeenth Century.) A city of eastern Bengal, India, capital of the district of the same name, situated on several small but steep hills on the Karnaphuli, 7 miles from its mouth, in latitude 22° 20′ N. and longitude 91° 54′ E. (Map: Burma, A 2). Its climate is malarious. An important commercial centre under the Portuguese, it came into possession of the British, with Bengal proper, in 1760-65. But having originally formed part of Arakan, it was claimed, after a lapse of sixty years, by the Burmese Emperor, as a dependency of that territory—a claim which constituted one of the grounds of the War of 1824. It has ship-building industries, and a considerable export trade in rice, jute, gunny, and tea. The United States is represented by a consular agent. Population, 24,100.

CHITTAGONG WOOD. The wood of *Chickrassia tabularis*, a tree of the order Cedrelaceæ, a native of the mountainous countries to the east of Bengal. In some parts of India it is called *cedar* or *bastard cedar;* names, however, which are also given to other kinds of wood. Chittagong wood is much valued in India, and is used for all purposes for which mahogany is used in Great Britain. It makes beautiful and light furniture, but is apt to warp in very dry weather. Beautifully veined and mottled pieces are occasionally met with, and are highly valued.

CHIT′TENDEN, Russel Henry (1856—). An American chemist. He was born in New Haven, Conn., February 18, 1856; graduated at the Sheffield Scientific School of Yale University in 1875; became instructor in chemistry at Yale in 1876; studied in Heidelberg, Germany, in 1878-79; took his doctor's degree at Yale in 1880; and has been professor of physiological chemistry there since 1882. Since 1898 he has also been lecturer on physiological chemistry at Columbia University, New York. He is a member of numerous scientific bodies, and has been president of the American Physiological Society since 1895, and director of the Sheffield Scientific School since 1896. Dr. Chittenden has carried out several important researches in physiological chemistry, and has written *Digestive Proteolysis* and numerous scientific papers.

CHITTENDEN, Thomas (1730-97). The first Governor of Vermont. He was born in East Guilford, Conn., but emigrated to the so-called New Hampshire Grants (now Vermont) in 1774. Here he took an active part in the controversy with New York, and was a member of the convention which declared Vermont a State (1777), and of the State Constitutional Convention of 1778. He was then Governor from 1778 to 1789, and again from 1790 to 1797. Consult Chipman, *A Memoir* (Boston, 1849).

CHITTIM, kĭt′tĭm. See Kittim.

CHITTUR, chĭt-tōōr′. A town in the native Rajput State of Udaipur, India, 270 miles southwest of Agra (Map: India, B 4). It is remarkable for the fortress which occupies the summit of an isolated rock, nearly 6000 yards in length and 1200 yards in breadth. The rock is scarped all round to a depth of 80 or 100 feet, about a fourth part of the entire altitude of 500 feet. Within the inclosure, formed by a wall 12 miles in circuit, are several temples, tanks, a palace, commemorative pillars, and an inner citadel. Population of adjacent town, 7000.

CHIT′TY, Joseph (1776-1841). An English lawyer and writer on law. He was a successful practitioner at the bar, and enjoyed a great reputation for legal learning. His writings became the text-books of the generation succeeding his own, their accuracy and systematic character rendering them peculiarly suitable for the purposes of law students. Among his principal works are: *Treatise on Parties to Actions and to Pleadings* (1808); *Treatise on the Law of Nations Relative to the Legal Effects of War on the Commerce of Belligerents and Neutrals, and on Orders in Council in Licenses* (1812); *Treatise on Criminal Law* (1816); *Synopsis of Practice in the King's Bench and Common Pleas* (1831-32); *Treatise on Bills of Exchange and Promissory Notes* (1799); and an edition of *Blackstone's Commentaries* (1832).

CHIUN, kī′ŭn. A deity mentioned by the prophet Amos (v. 26), who reproaches the Israelites for having carried "the tabernacle of your Moloch [marg. better: Siccuth, your king], and Chiun, your images, the star of your God." The latter idol, Chiun, is now generally recognized to have the Babylonian name of the planet Saturn—*Kaiwan*, as the Syrians, Mandeans, and Persians called him. The assertion that there is an Egyptian god *Ken*, who may be identified with Chiun, is quite unfounded.

CHIUSI, kyōō′sē. A town of central Italy, in the Province of Siena, 37 miles southeast of Siena, with a population of 5000. It stands on an eminence in the Val di Chiana, not far from the lake of the same name. In ancient times, under the name of Clusium, it was one of the twelve cities of Etruria, and the residence of Porsena (q.v.). When Italy was overrun by the barbarians, Chiusi fell into decay, the whole valley was depopulated, and became the pestilential pool described by Dante. Since the improvement of the course of the Chiana (q.v.), Chiusi has begun to flourish again along with the whole district. But it is in connection with the discovery of Etruscan antiquities that Chiusi is chiefly heard of, as the necropolises have yielded a long series of objects, representing Etruscan products and imports from Greece. The earliest graves show no Greek wares, and must reach well back into the Eighth Century B.C. Succeeding graves contain Greek vases of the Seventh Century, and from the beginning of the Sixth Century are found the chamber tombs, often richly decorated. The importance of the place is shown by the 3000 Etruscan inscriptions found in the neighborhood. The objects found in the graves are partly in the local museum and partly in Florence. Beneath the town is a series of underground passages which seems to belong to the old Etruscan system of drainage. Population, in 1881 (commune), 5017; in 1901, 6011. Consult Dennis, *Cities and Cemeteries of Etruria*, Vol. II. (rev. ed., London, 1878).

CHIVALRY, shĭv′al-rĭ (Fr. *chevalerie*, horsemanship, knighthood, from *chevalier*, horseman, knight, from *cheval*, horse, from Lat. *caballus*, horse). In the Middle Ages, the body of customs and ideals relating to the duties and privileges of knighthood. It owed its development at first to feudal usages, with which it had many relations, and later to the Church, which adopted and altered the customs of chivalry to further its own control of society. Chivalry probably had its origin in the ancient Germanic custom of arming the youth solemnly in the presence of the warriors. Tacitus refers to this usage, and it seems to have prevailed throughout the early Middle Ages. The chronicles record that Louis the Pious, at the age of thirteen, received his arms from Charles the Great, and that Charles the Bald, at the age of sixteen, received his arms from Louis. The cavalry, after the middle of the Eighth Century, grew to be the most important part of the army, and as feudalism developed there was a tendency to fix the customs for the assumption of the arms and to define the duties of the knight. The last were, to a great extent, the regular duties of a vassal, which included bravery, fidelity, and loyalty. The conception of knightly honor, which grew up slowly, was comparatively late. The Crusades and the intense interest in religious matters in the Twelfth Century tended to make chivalry more Christian. It was held to be the knight's duty to defend Christianity, to protect the Church, and to battle against the infidel. Lanfranc Cigala, a little later, wrote: "I do not hold him to be a knight who does not go with a willing heart and all his might to the aid of the Lord, who has so great need of him."

According to the mediæval conception of chivalry, no one was born a knight. The candidate for the honor was sent, at the age of about seven, to act as page or valet in the household of some knight. There he obtained his education, and when old enough might become a squire. The duty of the squire was to attend the knight in battle or in tournament, to care for his horse and weapons, and to act as his aid. In time, the squire might be made a knight. The distinction could be conferred in the earlier period by any knight; at a subsequent period, the monarchs claimed the sole right to confer knighthood. The age when the squire became a knight varied; there are cases where the honor was conferred on boys of ten or eleven, but later it was usual to defer it until the age of twenty-one or later. In fact, some squires never became knights, in order to avoid the expense of the ceremony. In France, in the Thirteenth Century, a royal order punished with a fine noble squires who had not become knights by the time that they were twenty-four years old.

The ceremony of admission into knighthood, known as 'dubbing,' usually took place on a festival, although squires were often made knights on the battlefield, in recognition of deeds of bravery. Occasionally before a battle took place the dignity was conferred upon a considerable number. The essential parts of the dubbing in the early Twelfth Century were the *collée*, or accolade, a blow upon the neck or shoulder, and the running the *quintaine*—i.e. tilting on horseback against a figure stuffed with straw. Later there was a symbolical and mystical development, which made the process of initiation mainly a religious ceremony. According to one ritual of the Fifteenth Century, the following were the details of the ceremony: After bathing, as a symbol of purity, the candidate 'watched' his arms for a whole night before the altar of some church or the grave of some saint, and in the morning he confessed, often aloud, attended communion and mass, and listened to a sermon on the duties of purity, fidelity, honesty, the protection of the Church, widows, orphans, ladies, and all who were oppressed. A priest then blessed his sword and other pieces of armor: a knight made him take oath to fulfill all his duties; then the accolade, which consisted of three strokes with the sword, was given solemnly, and the following sentence uttered: "In the name of the Father, Son, and Holy Ghost, I make you knight." The knight who had given the accolade embraced the new knight, and girded him with his sword; the godfathers put on him the golden spurs, the symbol of knighthood; and the lords and ladies present assisted in clothing him with the other pieces of armor. Lastly, he mounted on horseback and ran '*la quintaine*.'

At the end of the Twelfth Century and later, chivalry was profoundly influenced by the popular romances of Arthur, Charlemagne, and other famous heroes. Manners became less brutal, and a spirit of knight-errantry grew up. It became the fashion to be rash, imprudent, and extravagant in conduct. The *Orlando* of Ariosto and *Don Quixote* have made the follies of declining chivalry familiar to all. Chivalry was at its best in the Twelfth Century, in the Fourteenth was declining rapidly, and in the Fifteenth was thoroughly decadent. Knight and squire gradually became mere titles of honor which might be hereditary. Consult: Gautier, *La chevalerie* (Paris, 1884); id., English translation by Firth (London, 1890); Sir Walter Scott, *Essay on Chivalry* (London, 1868); and Stebbing, *History of Chivalry and the Crusades* (London, 1830). See FEUDALISM; KNIGHT; ORDERS.

CHIVALRY, COURT OF, or MARSHAL'S COURT. An ancient military court of great dignity, which was formerly held by the Lord High Constable of England and the Earl Marshal. It had jurisdiction over civil matters affecting the naval establishments abroad, and of all military matters and infractions of the martial law both within and without the kingdom. The extension of the jurisdiction of the common-law courts and the transfer of the jurisdiction over purely military offenses to modern courts-martial, instituted by Parliamentary authority, has reduced the court of chivalry to a purely honorary position at the English Court. During the Seventeenth and Eighteenth centuries it played the rôle of a court of honor (see HERALD'S COLLEGE), but at the present time it has no legitimate function but that of "redressing encroachments and usurpations in matters of heraldry and coat-armor." If in fact it should exercise this authority, the Earl Marshal alone would act as judge of the court, the office of Lord High Constable having fallen into abeyance. Consult the commentaries of Blackstone and Stephen.

CHIVALRY, TENURE IN. The characteristic form of land tenure under the feudal system, the vassal, as tenant in chivalry, holding his land of his feudal lord on condition of military service. See the articles FEUDALISM; KNIGHT; TENURE.

CHIVASSO, kê-väs'sô. A city in north Italy, on the left bank of the Po, 18 miles northeast of Turin (Map: Italy, B 2). It markets grain and cattle. It was the residence of the dukes of Montferrat, and a stronghold until the fortifications were destroyed by the French in 1804. The sulphur baths of San Genesio, two miles south of the town, are frequented from May to December. Population, in 1881 (commune), 9930; in 1901, 9913.

CHIVE, or **CIVE** (from Lat. *cepa*, onion) (*Allium schœnoprasum*). A plant of the same genus with the leek and onion (see ALLIUM), a perennial, one-half to one foot in height, with very small, flat, clustered bulbs, increasing by its bulbs so as to form a sort of tuft. The leaves are tubular, cylindrical-tapering, radical, nearly as long as the almost leafless flowering stem, which is terminated by a hemispherical, many-flowered umbel of bluish-red or flesh-colored flowers. The plant grows wild on the banks of rivers, and in marshy or occasionally flooded places in the middle latitudes of Europe and Asia, and on the northern borders of the United States. Chives are commonly cultivated in kitchen gardens, often as an edging for plots, and are used for flavoring soups and stews. Their properties are very similar to those of the onion. The part used is the young leaves, which bear repeated cuttings during the season.

CHIV'ERY, JOHN. The son of a Marshalsea turnkey in Dickens's *Little Dorrit*.

CHIVILCOY, chē'vêl-kō'ê. A town in the Province of Buenos Ayres, Argentina, situated in a populous district west of Buenos Ayres (Map: Argentina, F 10). The inhabitants, among whom are many Italians and Basques, are engaged chiefly in the manufacture of brandy, ironware, and machinery. Population, 15,000.

CHIVOT, shê'vô', Henri (1830—). A French writer of vaudevilles. He was born in Paris, where he brought out a large number of very successful vaudevilles, light comedies, and operettas, most of which were written in collaboration with Alfred Duru (died 1889). Among these may be mentioned: *Le soldat malgré lui*, operetta in two acts, music by M. F. Barbier (1868); *Les cent vierges*, operetta in three acts, music by M. Lecocq (1872), libretto written in collaboration with Clairville: *Le pompon*, music by M. Lecocq (1876); *Madame Favart*, operetta in three acts, music by J. Offenbach (1879), of which 200 performances were given in Paris; *La mascotte*, comic opera, in three acts, music by Audran (1881); *La cigale et la fourmi*, music by Audran (1886).

CHLADNI, kläd'nē, Ernst Florens Friedrich (1756-1827). A German physicist. He was born in Wittenberg, and studied law there and in Leipzig. He ultimately abandoned the legal profession in order to devote himself to physical science, and, being acquainted with music, was led to observe that the laws of sound were by no means so well established as those of other branches of physics. He therefore began to apply his knowledge of mathematics and physics to acoustics, and traveled for ten years (after 1802) through Germany, Holland, France, Italy, Russia, and Denmark, giving a series of successful lectures on the subject. He discovered the longitudinal vibration of strings and rods, and also produced the experiments since known by his name (see Chladni Figures), where the vibration of a plate is studied by means of sand figures. Using organ-pipes, he was able to determine the velocity of sound in gases other than air, and, in addition, was the inventor of many pieces of acoustic apparatus. Chladni's writings include *Entdeckungen über die Theorie des Klanges* (1787); *Akustik* (1802); *Neue Beiträge zur Akustik* (1817); *Beiträge zur praktischen Akustik und zur Lehre vom Instrumentenbau* (1822). Chladni also wrote several essays on meteoric stones. Consult: Bernhardt, *Dr. Ernst Chladni der Akustiker* (Wittenberg, 1856); Melde, *Chladnis Leben und Wirken* (Marburg, 1888); Kohlschütter, *Ernst Florens Friedrich Chladni* (Hamburg, 1897).

CHLADNI FIGURES. Figures produced by sand on a vibrating plate, forming designs more or less complex, and depending upon the vibrations of the plate. This important experiment is due to Chladni (q.v.), and illustrates the formation of nodes and segments in a vibrating plate. The plate used in the experiment may be either metal or glass, and in shape may be a disk, a square, or any other form whose vibrations it is desired to study. The plate is clamped to a stand at its centre, and its edge is rubbed with a violin bow and set into vibration. The point where the plate is clamped will of course be a point of rest or node, while the part of the plate in contact with the bow executes the maximum vibration and will be a ventral segment. When sand is strewn on the plate it will take a position along the nodes, being forced away from the points of vibrations to positions of rest. The figures formed by the sand take various forms, and indicate the vibration of the plate. A few of these figures, together with a plate clamped in position, are shown in the illustrations. The Chladni figures will be found described in most of the treatises on physics, among which Müller, *Lehrbuch der Physik und Meteorologie* (9th ed., by Pfaundler, Brunswick, 1886), originally an adaptation of Pouillet, *Eléments de physique*, may be recommended.

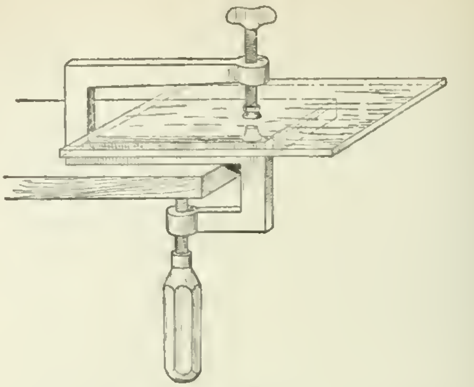


FIG. 1. CLAMP AND PLATE FOR CHLADNI EXPERIMENT.

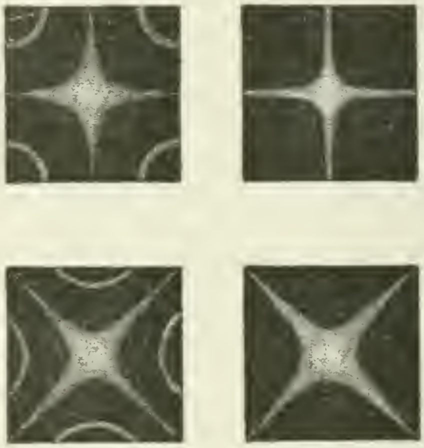


FIG. 2. CHLADNI FIGURES.

CHLAMYDOSAURUS, klăm'ĭ-dô-sa̤'rŭs. See Frilled Lizard.

CHLA'MYS (Lat., from Gk. χλαμύς). A form of cloak worn among the Greeks by huntsmen and horsemen, and the special garment of the Athenian ephebi. It was straight on one edge, but circular on the other, with two long side pieces, from which it was sometimes called the 'Thessalian wings.' It was clasped over one shoulder or the breast. As the regular dress of the cavalry it appears in a manifold variety of adjustments on the frieze of the Parthenon. It was not a woman's garment. The material was usually wool, and it seems often to have been of bright colors.

CHLOË, klō'ē (Lat., from Gk. χλόη, blooming, verdant). A pretty, sportive shepherdess in the Greek romance *Daphnis and Chloë*. She has become the stock idyllic heroine. The name and character appear in Sidney's *Arcadia*, in Fletcher's *Faithful Shepherdess*, in Prior's poems, and elsewhere. There is also a Chloë in Jonson's *Poetaster*, although in this case her personality can hardly be described as bucolic.

CHLOPICKI, klô-pĭts′kĭ, JÓZEF (1771-1854). A Polish general and dictator of Poland during the Revolution of 1830-31. He was born in Galicia, entered the army in 1787, and fought gallantly in the war for independence under Kosciuszko. After the surrender of Warsaw to the Russians, November 8, 1794, Chlopicki went to France, and joined the army of the Cisalpine Republic, under General Dombrowski. In 1806, when Dombrowski and Wybicki called the Poles to arms, under the protection of Napoleon, Chlopicki returned to his country, and fought gallantly at Eylau and Friedland (1807). From 1808 to 1811 he took part in the Spanish campaign. In 1812 he followed Napoleon to Russia, taking part in the bloody engagements at Smolensk and on the Moskva. After the remnants of the invading force had returned, Chlopicki left the Imperial service, on account of certain slights. After the taking of Paris by the Allies in 1814, Emperor Alexander made him a general of division in the new Polish Army, but he soon resigned, owing to the violent temper of the commander-in-chief, the Grand Duke Constantine. When the insurrection of the Poles broke out in 1830, Chlopicki, who foresaw the hopeless nature of the attempt, reluctantly obeyed the voice of the nation, which had conferred upon him the dignity of dictator (December 5). His moderate views and hesitating policy involved him in disputes with the patriot party, and on January 23, 1831, he resigned his office; but to prove his sincerity, he entered the Polish Army as a private soldier, and took part as such in the battles of Waver and Grochow. After the suppression of the insurrection, Chlopicki went to Cracow, and withdrew altogether from public life.

CHLO′RAL (from Gk. χλωρός, *chlōros*, greenish-yellow), CCl_3CHO. A colorless oily liquid extensively used in medicine, in the form of its hydrate. It has a peculiar irritating smell, and boils at 97° C. Its specific gravity at 20° C. is 1.512. It is made on a large scale by the prolonged action of chlorine on ordinary alcohol; this yields first chloral alcoholate, which is then transformed into chloral by distilling with strong sulphuric acid at temperatures slightly below 100° C. When mixed with an equivalent quantity of water, chloral forms the hydrate $CCl\,CH(OH)_2$, which no longer contains the aldehyde group, CHO, contained in chloral.

Chloral hydrate is a colorless crystalline substance freely soluble in water and melting at 57° C. When distilled with sulphuric acid, it is retransformed into chloral. Alkalies transform chloral or its hydrate into chloroform. Chloral is a powerful antiseptic, and, if taken internally, acts as a powerful general depressant, especially depressing the heart and causing a slow, feeble, irregular pulse. It acts directly on the brain, and, if administered in medicinal doses, produces sleep which is refreshing and does not seem to differ in any way from natural sleep. Frequent administration of chloral is, however, liable to cause what is known as chronic chloral poisoning, and may permanently affect the mind. In cases of poisoning from an overdose of chloral, sleep should be prevented by all means, a strong coffee solution should be injected into the rectum, etc. Chloral is often administered in tetanus, whooping-cough, incontinence of urine, and other diseases. The medicinal dose of chloral hydrate is from 5 to 20 grains. Chloral was discovered by Liebig in 1832, and Liebreich, in 1869, was the first to use it as an anæsthetic and hypnotic. *Chloralamide* and *chloralimide* are chemically allied to chloral; these substances were recently introduced in medicine as substitutes for chloral.

CHLORAL HY′DRATE. See CHLORAL.

CHLO′RALAM′IDE, and **CHLO′RALIM′IDE.** Substances used in medicine as substitutes for chloral (q.v.).

CHLORAS′TROLITE (from Gk. χλωρός, *chlōros*, greenish-yellow + ἄστρον, *astron*, star + λίθος, *lithos*, stone). A green, opaque, usually mottled and stellated variety of *prehnite* or *thomsonite*, that is found in amygdaloid traprock on the Ile Royale, Lake Superior. The mineral generally occurs in the form of rolled pebbles on the beach, and takes a high polish, in consequence of which specimens are cut as gems and sold to tourists.

CHLOREN′CHYMA (Neo-Lat., from Gk. χλωρός, *chlōros*, greenish-yellow + ἔγχυμα, *enchyma*, injection, from ἐγχεῖν, *enchein*, to pour in, from ἐν, *en*, in + χεῖν, *chein*, to pour). A collective name for the tissues which bear chlorophyll (q.v.), the characteristic green pigment of plants. See LEAF.

CHLO′RIC ACID (from Gk. χλωρός, *chlōros*, greenish-yellow), $HClO_3$. A colorless liquid with a pungent odor, prepared by decomposing barium chlorate with dilute sulphuric acid. It rapidly bleaches vegetable colors, and gives up its oxygen to organic bodies so rapidly that they take fire. With the metals chloric acid forms a series of salts called chlorates. The most important of these is potassium chlorate, a white crystalline compound made on a large scale by passing chlorine gas into a hot solution of lime and adding potassium chloride. Potassium chlorate then separates out in the form of a mass of crystals, and may be purified by recrystallization from water. Potassium chlorate is largely used as a source of oxygen gas. It also finds application in calico-printing, in the manufacture of safety matches, in the production of fireworks, and as a detonator. Finally, it is employed medicinally in throat troubles, and it is especially valuable in the treatment of ulcerative stomatitis.

CHLO′RIC ETHER. A name formerly given to chloride of ethylene, or *Dutch liquid*, $C_2H_4Cl_2$. The name is now applied to spirits of chloroform, a mixture containing 6 per cent. of chloroform and 94 per cent. of alcohol; spirit of chloroform is often used in medicine as a flavoring agent.

CHLO′RIDES. See HYDROCHLORIC ACID.

CHLORIM′ETRY, or **CHLOROM′ETRY** (from Gk. χλωρός, *chlōros*, greenish-yellow + μέτρον, *metron*, measure). The process of estimating the amount of chlorine in hypochlorites, as bleaching-powder. The process depends upon the oxidizing power of chlorine. The laboratory methods usually employed consist in determining the amount of bleaching-powder required in order to convert a known amount of arsenious acid into arsenic acid, or a known amount of ferrous salt into ferric salt; or else in determining the quantity of iodine which will be liberated by a given amount of bleaching-powder from a standard solution of potassium iodide. The first of these methods, originally proposed by Gay-Lussac, is applied in the following manner: A solution of arsenious oxide and hydrochloric acid is prepared of known strength, as one in which a cubic centimeter requires for its conversion into arsenic oxide 0.01 gram of chlorine. A known amount of the bleaching-powder is then mixed with water, made up to a given quantity, and poured from a burette into the arsenious oxide solution, which has been colored blue by adding a drop of indigo. The disappearance of the blue color indicates that the arsenious acid has been entirely converted into arsenic acid, and the amount of chlorine may then be determined from the quantity of bleaching-powder solution used.

CHLO′RINE (from Gk. *χλωρός*, *chlōros*, greenish-yellow). A gaseous element discovered by Scheele in 1774. It was supposed by its discoverer to be hydrochloric acid deprived of phlogiston, and was called by him dephlogisticated marine acid gas. In 1785 Berthollet advanced the view that this gas should be regarded as a compound of hydrochloric acid with oxygen, and this view was universally maintained for nearly a quarter of a century. The error was first pointed out by Gay-Lussac and Thénard in 1809, and in the following year Davy demonstrated clearly the elementary nature of the gas, which he named chlorine. It is never found free, but occurs extensively in the form of chlorides, as in the mineral halite, or rock salt, and in sea-water; in sylvite (potassium chloride); in cerargyrite (silver chloride); also as alkaline chlorides in plants and animals. It may be readily prepared by the action of hydrochloric acid on manganese dioxide, the chlorine gas thus produced being washed by passing through a small quantity of water and drying with sulphuric acid. Commercially it is obtained by passing over heated bricks a mixture of air and hydrochloric acid, the oxidation of the latter giving rise to the formation of free chlorine, which is then utilized for the manufacture of bleaching-powder (q.v.).

Chlorine (symbol, Cl; atomic weight, 35.45) is a greenish-yellow gas with an irritating odor. It is liquefied at 15° C. (59° F.), under a pressure of four atmospheres, yielding a dark-yellow liquid heavier than and not miscible with water. Chlorine is a non-conductor of electricity, and is exceedingly poisonous; it attacks the mucous membranes, causing much irritation, and if inhaled is capable of causing death. It dissolves in half its volume of cold water, yielding a solution that resembles the gas in color, odor, and other properties. It finds important application in the arts as a bleaching agent, and is very extensively used in cotton and paper industries. Its bleaching action is due to the readiness with which it combines, in the presence of water, with the hydrogen of the coloring matter. This avidity for the hydrogen of organic matter may be demonstrated by introducing a lighted taper into an atmosphere of chlorine—the taper will continue to burn, its hydrogen combining with the chlorine, while its carbon is liberated in the form of soot. Chlorine is also a powerful disinfectant and deodorant, and is much used for the destruction of the poisonous germs of infectious diseases. In chemical processes chlorine is frequently used as an oxidizer. Chlorine combines readily with basic radicals to form chlorides. Its most important compounds are described under SALT; BLEACHING-POWDER; HYDROCHLORIC ACID, etc. Consult Richardson and Watts, *Treatise on Acids, Alkalies, and Salts* (London, 1863-67); also authorities referred to under BLEACHING.

CHLO′RIS (Lat., from Gk. Χλωρίς). (1) The Greek goddess of flowers, identified with the Roman goddess Flora. (2) One of the daughters of the Theban Amphion and Niobe. She and her brother Amyclas were the only children of Niobe, who escaped being slain by Apollo and Artemis. (3) The daughter of Amphion of Orchomenos, and the mother of Nestor.

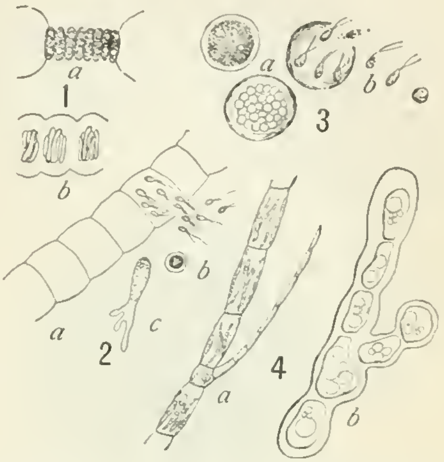
CHLO′RITES (from Gk. *χλωρός*, *chlōros*, greenish-yellow). A group of minerals crystallizing in the monoclinic system and related to the micas. They are silicates of aluminum, magnesium, and ferrous iron—the latter constituent causing the characteristic green color—and also contain chemically combined water in varying proportions. The aluminum may be replaced partially by ferric iron. They occur as distinct crystals, or in the form of fibres and scales, which possess a well-marked cleavage. The chlorites are usually secondary minerals—i.e. they have been formed by the alteration of other magnesium silicates, such as garnet, amphibole, pyroxene, biotite, etc. This process of alteration, commonly called chloritization, may be frequently observed among the older rock formations. (See CHLORITE SCHIST, and METAMORPHISM.) In chemistry the name chlorites is applied to the salts of chlorous acid.

CHLORITE SCHIST, klō′rīt shĭst. A foliated rock containing more or less chlorite in parallel plates. Associated with the chlorite may be quartz and feldspar in considerable quantity, hornblende, talc, mica, iron ores, and a great variety of the rarer minerals. Chlorite varies in quantity from an exceedingly small amount to predominance. Chlorite schists are metamorphic rocks resulting from the alteration of almost any rock of appropriate composition. The chlorite may replace biotite in biotite schists, or, under proper conditions of pressure, temperature, etc., it may crystallize out from a rock originally containing no chlorite. See CHLORITE; METAMORPHISM.

CHLO′ROFORM (from *chlorine* + *formyl*), or TRICHLOROMETHANE, $CHCl_3$. A colorless, heavy liquid having a sweetish, ethereal odor and a sweetish, burning taste. It does not mix with water, but dissolves freely in alcohol and ether. Its specific gravity at 15° C. is 1.498, and it boils at 61° C. It is an excellent solvent for a variety of substances, such as camphor, iodine, sulphur, phosphorus, resins, fats, alkaloids, etc. It is chiefly used, however, as an anæsthetic. It is formed by the direct action of chlorine on methane, or marsh gas, in sunlight; further, by the action of sodium or potassium hydroxide on chloral (q.v.). The method usually employed in making chloroform on a large scale consists in distilling from iron retorts a mixture of bleaching-powder, water, and ordinary alcohol, or preferably acetone; the crude product of distillation is purified by shaking with strong sulphuric acid and redistilling. To be fit for use as an anæsthetic, chloroform must be perfectly pure; and as by the action of light it is readily decomposed if kept in contact with moist air, bottles containing chloroform should be well stoppered and kept in the dark. Pure chloroform is not darkened by shaking with sulphuric acid; it should also contain no phosgene gas, which forms by the action of moist air on chloroform, and may cause bad after-effects when the latter is employed as an anæsthetic. To prevent the formation of phosgene gas a small amount of alcohol is added to chloroform. The presence of chloroform in substances submitted for examination may be readily detected by the so-called carbylamine reaction: a small quantity of the substance is gently warmed with a mixture of aniline and an alcoholic solution of caustic potash, when, if chloroform was present, an intensely nauseous smell is observed. due to the formation of carbylamine (phenyl isocyanide). Preparations of chloroform are often used to mask the taste of nauseous medicine. The chances of danger from using chloroform as an anæsthetic are very small; statistics show that no more than one death occurs in 3000 cases of administration of the substance. Ether, however, is even safer, and is in this country preferred to chloroform. If inhaled in small quantities, chloroform has the effect of abolishing the sensation of pain: for this purpose it is successfully employed in labor. It may also be inhaled to relax spasms in cases of tetanus, etc. As an anæsthetic, chloroform should be administered with the greatest caution, and ether is substituted for it if the patient suffers from heart disease. If anæsthesia be prolonged several hours, three stages may be distinguished: At first the highest functions of the organism are affected; confusion of the mind is accompanied in the patient by a pleasurable feeling throughout the body; general sensation is blunted, while the lower motor functions are powerfully excited, and the arms and legs are tossed about in a disorderly manner. This is followed (second stage) by general depression, and soon general anæsthesia sets in. The administration of chloroform is, however, carried on until the patient is partially narcotized and reflex excitability is completely abolished (third stage). During the administration of chloroform, vomiting is very liable to occur. If dangerous symptoms appear, artificial respiration should at once be resorted to, brandy injected subcutaneously, and the patient's lower extremities elevated. Chloroform was discovered by Liebig and Soubeiran in 1831; its anæsthetic properties were first observed by Simpson, of Edinburgh, in 1848.

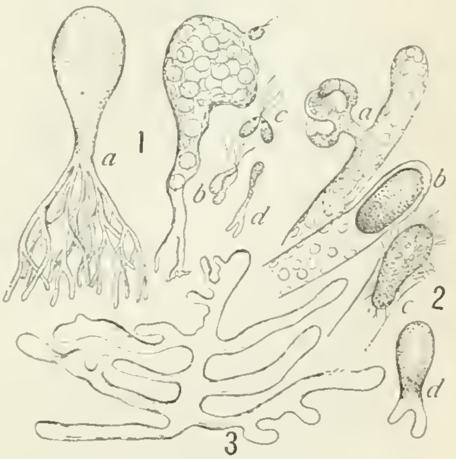
CHLO′ROPHANE (from Gk. χλωρός, *chlōros*, greenish-yellow + φαίνειν, *phainein*, to appear). A variety of fluorite or fluorspar which emits a bright emerald-green light on a comparatively low rise of temperature, in consequence of which it has some value as a gem-stone. Excellent specimens of this mineral are found in Trumbull, Conn., and also Amelia Courthouse, Va.

CHLO′ROPHY′CEÆ (Neo-Lat. nom. pl., from Gk. χλωρός, *chlōros*, greenish-yellow + φῦκος, *phykos*, seaweed). One of four great groups of algæ, and commonly called the green algæ. It comprises a large and diverse assemblage of orders and families, partly described in the article Algæ (q.v.). The color of the cells is generally clear green, due to chlorophyll which is not masked by the presence of other pigments, as in the red, brown, and blue-green algæ. The types of Chlorophyceæ range from one-celled forms to those as conspicuous as the sea-lettuce (Ulva) and stoneworts (Charales). The lower groups generally live in water, where they form sediment in the bottom of ponds and ditches, or slimy coatings on the surfaces of water plants or other objects. Certain groups are free-swimming, the cells being provided with cilia. Many of the simpler forms live in the air, on bark of trees, on stonework, and in other moist and shaded situations. The green growth, pleurococcus, on the north side of trees, is a familiar example.



CHLOROPHYCEÆ.

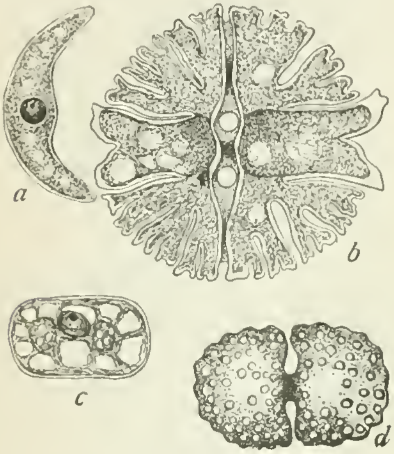
1, *Scenedesmus* (*a*), and its division (*b*); 2, *Ulothrix*, showing escaping spores (*a*), a resting spore (*b*), and its germination (*c*); 3, *Chlorosphæra*, showing resting stage (*a*), and formation of spores (*b*); 4, *Stigeoclonium*.



CHLOROPHYCEÆ.

1, *Botrydium* (*a*), showing formation of gametes (*b*), their fusion (*c*), and a young plant (*d*); 2, *Vaucheria*, showing sex-organs (*a*) formation of large spore (*b*), its escape (*c*), and germination (*d*); 3, *Bryopsis*.

Among the unicellular forms the desmids are the most conspicuous and beautiful, comprising an immense number of species. Above the unicellular green algæ are found filamentous types, sometimes called confervas, and also membranous growths especially well illustrated in the sea-lettuces. Some of the filamentous forms are slimy, and appear as frothy scums on the surface of the water ('pond-scums'). Other kinds, as the genus Vaucheria, form coarse, rough mats at the bottom of ponds and ditches, or on moist earth. The water-net (*Hydrodictyon*) sometimes grows so luxuriantly as almost to fill the water. The highest groups in complexity of body are the stoneworts and certain marine forms, e.g. Caulerpa, which are differentiated into stems, leaves, and root-like organs of attachment. The resting stages of some Chlorophyceæ are very conspicuous. The color of 'red snow' is due to the presence of the resting spores of one of the Volvocales.



CHLOROPHYCEÆ.
Desmids: *a*, Closterium; *b*, Micrasterias; *c*, *d*, Cosmarium.

Generally speaking, the algal flora of a pond or ditch depends largely on the season of the year, the chemical nature of the water, and the illumination, but also to a great extent upon biological factors involved in the special adaptation of species to one another and their environment.

There are many special monographs covering various orders in this large group. For general treatment, consult Engler and Prantl, *Die natürlichen Pflanzenfamilien* (Berlin, 1899 et seq.). See ALGÆ.

CHLOR'OPHYLL (Neo-Lat. *chlorophyllum*, from Gk. χλωρός, *chlōros*, greenish-yellow + φύλλον, *phyllon*, leaf). The green coloring matter of ordinary foliage. This is not a single pigment, but a mixture of at least two, one a green pigment, to which the name is sometimes restricted, and a yellow pigment, carotin (q.v.) or xanthophyll. Chlorophyll is also often associated with blue (phycocyanin), brown (phycophæin), or red (phycoërythrin) pigments, especially in the algæ showing these tints. Chlorophyll is only found associated with protoplasm, by which, indeed, it is produced. In some of the small plants it may color the whole protoplasm of the cell, but usually it is restricted to certain definite portions of the protoplasm called chloroplasts (q.v.). It is restricted to plants, though it is not found in all, being wanting in the whole class of fungi, and in some of the seed-plants, especially those which live as parasites or saprophytes (q.v.). Chloroplasts have been said to occur in animals, but they turn out on examination to be minute green algæ, which live associated with the animal (e.g. hydra, sponges, certain radiolaria, etc.). The amount of chlorophyll in leaves, according to Tschirch, varies from 0.2 to 1 gram per square meter of surface. From the chloroplasts it may be extracted by various solvents, alcohol, ether, fatty and volatile oils, etc., but probably at once undergoes an alteration in its composition. In alcoholic solution it exhibits the property of fluorescence, being emerald-green by transmitted light and deep blood-red by reflected light. Molisch's test for chlorophyll is as follows: If a bit of dry tissue to be tested be wetted with a saturated watery solution of potassium hydrate, it instantly turns brown, and after 15-30 minutes becomes again green. This change appears immediately on heating or adding water.

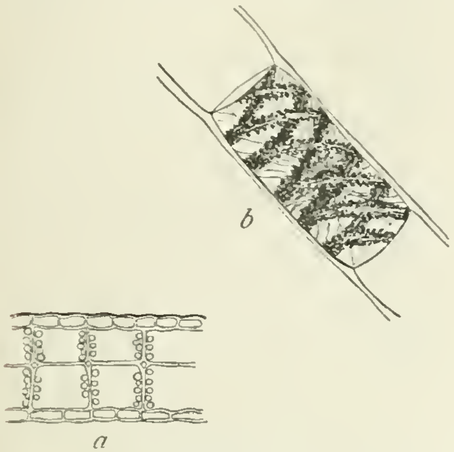
The chemical nature of chlorophyll is not satisfactorily known. It is a complex and exceedingly unstable nitrogenous carbon compound, probably not containing iron, as once believed. Attempts to analyze it result in so complex a series of decomposition products that it is difficult to draw any certain conclusions. All efforts to purify it or to crystallize it meet with the same difficulty, and all the so-called 'pure chlorophyll' is one or another decomposition product. Chlorophyll is chemically related to hæmoglobin, the red coloring matter of the blood, as shown by the fact that phylloporphyrin, a decomposition product of chlorophyll, is very nearly identical with hæmatoporphyrin, a decomposition product of hæmoglobin.

The coloring matters in a live leaf absorb certain wave-lengths of light, notably λ 680-660 (between the B and C lines of the spectrum). There are also weaker absorption bands about λ 615-600, λ 560-540, λ 530-527 (nearly E line), and extensive absorption beyond λ 490. These absorbed portions are utilized in part for the making of food (see PHOTOSYNTHESIS); though the greater portion of the energy is dissipated in evaporating water. In the absence of chlorophyll, however, no formation of carbohydrate foods can occur. To this there are only unimportant exceptions.

Chlorophyll is formed usually only in the plastids which lie near the surface of a plant exposed to light of certain intensity. It is produced in darkness in certain exceptional plants, e.g. embryos of pines. It is only produced within certain limits of temperature and in the presence of oxygen. Probably under the normal conditions of life it is being continually formed and as continually destroyed. Intense light promotes its destruction, so that plants may become blanched thereby. Ordinary blanching (e.g. of celery) is accomplished by darkening, whereby the formation of chlorophyll is checked.

CHLO'ROPLAST (from Gk. χλωρός, *chlōros*, greenish-yellow + πλαστός, *plastos*, formed from πλάσσειν, *plassein*, to shape). In botany, the protoplasmic body found in green plants and distinguished by the green pigment chlorophyll. Chloroplasts are developed only in the cells to which a sufficient amount of light penetrates; therefore, in the larger plants they are found only in the cells near the surface. The absorption of light by six to ten cell-layers is so complete that neither chlorophyll nor chloroplast is developed. Chloroplasts originate from preëxistent structures of the same kind. Unspecialized protoplasmic organs known as plastids (q.v.) multiply by direct division as the cells divide. Later those plastids in the superficial cells may differentiate into chloroplasts, which also may increase by direct division; those in storage organs may become leucoplasts (q.v.); or in appropriate regions they may form chromoplasts (q.v.); or the chloroplasts may later be transformed into chromoplasts.

The form of chloroplasts is quite various in some of the algæ. In Spirogyra there are one to several chloroplasts. Each is ribbon-like, with an irregularly toothed edge, somewhat depressed and thicker along the median line (thus troughlike) and spirally coiled in the protoplasm near to the cell-wall. In Mougeottia the chloroplast is single and plate-like, occupying the axis of the cell. In Zygnema there are two chloroplasts, each an irregular mass, with radiating arms reaching to the periphery. All these chloroplasts are peculiar in having one or more pyrenoids (q.v.) imbedded in them. In species of Anthoceros and Selaginella each cell contains a single irregular chloroplast. But in most algæ and mosses and in all the higher plants the chloroplasts are several or many in each cell, and have a somewhat flattened globoid or ovoid form.



CHLOROPLASTS.

a, Lemna, with chloroplasts against the vertical walls; *b, Spirogyra*, the two chloroplasts consisting of spiral bands.

The structure of the chloroplast, like that of other protoplasmic organs, is not definitely known: but it appears to be vacuolate, i.e. to consist of a firmer colorless portion inclosing many minute spaces filled with chlorophyll: but just how the latter is related to the colorless portion, and whether dissolved or not, is not satisfactorily determined.

The chloroplasts are capable of moving about the cell. When the protoplasm is rotating, the chloroplasts are swept along with it; but they are capable of independent creeping. When a leaf of sorrel, for example, is exposed to diffuse light, the chloroplasts arrange themselves on the best illuminated sides (top and bottom) with their broad sides turned to the light. This position is known as epistrophe. In direct sunlight they pass to the side walls, standing edgewise to the light, a position known as light apostrophe. A somewhat similar position is assumed in prolonged darkness (dark apostrophe), the chloroplasts accumulating also on the bottom of the cell.

Photosynthesis depends wholly upon the chloroplast and its associated chlorophyll. The decolorized chloroplast is unable to form carbohydrates, and chlorophyll separated from the chloroplast is equally functionless. See ETIOLIN; PHOTOSYNTHESIS; MOVEMENT; PROTOPLASM.

CHLORO′SIS (Neo-Lat., from Gk. χλωρός, *chlōros*, greenish-yellow). A peculiar form of anæmia, common in young women, and connected with the disorders incident to the beginning of menstruation. It has been called the *green sickness*, from the peculiar dingy greenish-yellow hue of the complexion in some patients. The disease is attended with very great debility, and often with breathlessness, palpitation, and other symptoms, including a perverted appetite, which leads the girl to eat chalk, slate pencils, etc. Chlorosis is curable in a large proportion of cases. The principal means to be employed are rest, out-of-door air, moderate exercise, a selected diet, proper clothing, iron, and arsenic.

CHLOROSIS. A diseased state of plants, in which a sickly green or greenish-yellow color takes the place of the natural color. Sometimes only a particular shoot is affected by it, but very generally the whole plant; and it seems to depend upon causes which render the plant altogether unhealthy, the pallid appearance being merely symptomatic, and not only the formation of chlorophyll, but all the functions of vegetable life being languidly and imperfectly carried on. There seems to be considerable evidence that chlorosis is largely due to malnutrition of the plant, but the specific cause is not known. Plants affected by this disease are often to be seen among crops generally healthy; but whole crops of grain, potatoes, etc., sometimes perish from it, or are much diminished in value. Fruit-trees also suffer from it. A severe attack of chlorosis on fruit-trees in a certain region in England is recorded where lime was abundant in the soil, and hence the attack could not be attributed to a lack of lime, as is sometimes claimed. A mixture of nitrate of potash, superphosphate, and iron sulphate was given the trees as a fertilizer, with excellent results. In France grapes are subject to chlorosis to a great extent, and good results are reported to have followed washing the vines and fertilizing them in winter or early spring with an iron sulphate solution.

CHMEL, kmĕl, JOSEPH (1798-1858). An Austrian historian, born at Olmütz. He was appointed in 1846 vice-director of State archives in Vienna. His works include *Die Handschriften der kaiserlich-königlichen Hofbibliothek zu Wien* (1840-41): *Geschichte Kaiser Friedrichs IV.* (1840-43); and *Urkunden, Briefe und Aktenstücke zur Geschichte Maximilians I.* (1845).

CHMIELNICKI, kmyĕl-nĭts′kē, BOGDAN (1593-1657). The leader of the Cossacks in the great revolt against Poland in the middle of the Seventeenth Century. He belonged to a noble Polish family, and was born in the Ukraine. He won by his bravery a high position among the Cossack tribesmen about the Dnieper. Oppressed by the Poles, the Cossacks rose in insurrection in 1648 under the leadership of Chmielnicki, who had been wrought up against the Poles by wrongs inflicted upon him. For a time Chmielnicki waged war victoriously, his followers committing the bloodiest excesses. At last, however, fortune forsook his standard, and in 1654 he placed himself under the protection of the Czar of Russia, who, in return for the suzerainty thus obtained, guaranteed to the Cossacks their ancient rights and privileges. In 1873 an equestrian statue of Chmielnicki was unveiled at Kiev. For his life, consult Kostomaroff (Saint Petersburg, 1859).

CHMIELOWSKI, kmyê-lôv'skê, PIOTR (1848-1904). A Polish writer, born in Podolia. From 1881 to 1897 he was editor of the *Ateneum*, a monthly review published in Warsaw. He wrote much in literary criticism, including *Studies and Sketches from the History of Polish Literature* (2 vols., 1886).

CHOATE, JOSEPH HODGES (1832—). An American lawyer and diplomat. He was born in Salem, Mass., and graduated at Harvard College in 1852, and at the Harvard Law School in 1854. He then practiced law for a year in Boston, and afterward went to New York City, where he soon became remarkably successful as a lawyer. In 1884 he became a member of the famous legal firm of Evarts, Choate and Beaman. As a trial lawyer he is unsurpassed, and since 1865 he has conducted some of the most noteworthy cases that have come before State and Federal courts, as well as international tribunals. Among them may be mentioned his successful defense of General Fitz-John Porter, the Tweed Ring prosecution, the Tilden will contest, the Chinese exclusion cases, the cases in which he successfully contested the constitutionality of the Income Tax Law of 1894, and the Bering Sea dispute, in which he represented the Canadian Government. Mr. Choate has been a Republican since 1856, when he supported John C. Frémont; and in 1894 he was president of the New York State Constitutional Convention. He has been an opponent of machine government, and in 1896 was defeated for the United States Senatorship by Thomas C. Platt. In January, 1899, President McKinley appointed him Ambassador to Great Britain to succeed John Hay. He is a graceful orator and after-dinner speaker.

CHOATE, RUFUS (1799-1859). One of the most famous of American lawyers. He was born in Ipswich, Mass., on October 1, 1799. As a child he was remarkable for precocity, beginning to read while still almost an infant, and being able before his sixth year to repeat large portions of the Bible and of *Pilgrim's Progress*. In 1815 he entered Dartmouth College, where he soon attracted attention by his scholarly habits and unusual abilities, and evinced an aptitude for classical and historical studies which characterized him through life. He graduated in 1819 as valedictorian of his class, was a tutor at Dartmouth during the following year, and then, under the inspiration of Webster's great speech in the Dartmouth College case, which he had heard in 1818, he took up the study of law, entering the Cambridge Law School in 1821 and subsequently removing to the office (in Washington) of William Wirt (q.v.), then Attorney-General of the United States. He returned to Massachusetts in 1822, continued his studies in Ipswich and Salem, was admitted to the bar in the following year, and began practice in Danvers. He married, in 1825, Miss Helen Olcott. He remained in Danvers until 1828, when he removed to Salem. In 1830 he entered Congress as a Whig, and immediately attracted general attention by a brilliant speech in favor of a protective tariff. He was reëlected in 1832, but resigned in 1834 before the expiration of his term, and opened an office in Boston, where he soon became the acknowledged leader, first of the local, then of the State, and finally of the New England bar. In 1841, Daniel Webster having become Secretary of State, Choate was elected to serve out his term in the United States Senate, and represented Massachusetts until 1845, taking a conspicuous part in the debates on the Oregon boundary, the tariff, and the annexation of Texas. Weakened by overwork, he spent the summer of 1850 in Europe. In 1852, as a member of the Whig Convention in Baltimore, he led the faction which advocated the nomination of Webster, delivering on this occasion one of his most eloquent addresses; and in 1856, along with a section of the conservative Whigs, he supported Buchanan in opposition to Frémont. In 1859 his health failed him, and under the advice of his physician he sailed for Europe, but, feeling unable to complete the voyage, he landed at Halifax, where in a few days—on July 13—he died. Throughout his life he was a thorough student not only of law, but also of the classics, English literature, and history, reading with avidity and remembering everything that he read. His eloquence and remarkable facility in the use of the English language, his intuitive knowledge of human nature, and the acuteness and vigor of his intellect combined to make him preëminently successful as a lawyer—especially as a jury lawyer—and in the course of a long career he seldom lost a case. Consult: Brown, *Life of Rufus Choate* (Boston, 1870); *The Works of Rufus Choate, with a Memoir* (2 vols., Boston, 1862); *Addresses and Orations of Rufus Choate* (6th ed., Boston, 1891); Neilson, *Memories of Rufus Choate* (Boston, 1884); and Whipple, *Recollections of Eminent Men* (Boston, 1886).

CHOBI, chō'bê. A Bantu people in southeastern Africa, extending from the Lower Limpopo to the sea. They are called Chobi on the river and Mindonga on the coast. They disfigure their faces with lumps raised by scarification.

CHOCOLATE (Mex. *chocolatl*, from *choco*, coca + *latl*, water). A preparation made from the seeds of *Theobroma cacao*. (See CACAO.) These seeds are first reduced to a fine paste in a heated iron mortar or by a machine, which is poured into molds of white iron, in which it is allowed to cool and harden. Chocolate is used as a beverage, and for this purpose is dissolved in hot water or milk. It is also much used as a confection, and for this purpose is mixed with sugar, flavoring matters, and various other substances. Cocoa is made by reducing chocolate to a powder and removing a portion of the cocoa-butter which it contains, thus rendering it more digestible. The cacao-tree from which chocolate is made flourishes in tropical regions.

The total annual product of chocolate is about 100,000,000 pounds. It was brought to Europe by the Spaniards, who learned its use from the

Mexicans. It was introduced into England about 1657. In the time of Charles II. it was still a great luxury, costing 6s. 8d. per pound.

Good chocolate is externally smooth, firm, and shining—not gritty in the fracture—easily soluble, aromatic; not viscid after having been liquefied and cooled, but oily on the surface, and leaves no sediment of foreign substances. Chocolate is adulterated in many ways, by mixing it with rice-meal, oat-meal, flour, potato-starch, roasted hazel-nuts or almonds, and with benzoin, storax, etc., in place of vanilla.

CHOC'TAW. An important Muskhogean confederacy, formerly occupying southern Mississippi and the adjacent parts of Alabama. They were sedentary and agricultural, slow and unwarlike in disposition, contrasting strongly with their cousins, the restless Chickasaw. Throughout the colonial period they generally sided with the French, but were always doubtful allies. They flattened the head and had peculiar burial rites, the body being disinterred after a few days, when the bones were picked clean by old men appointed for the purpose, and afterwards preserved in their houses. About the close of the Revolution they began to drift westward into Louisiana. In 1830 they ceded all their remaining lands east of the Mississippi and removed to their present country in the Indian Territory, where, under the style of the 'Choctaw Nation,' they now have an autonomous form of government similar to that of the Cherokee (q.v.). There are now about 20,000 'citizens' in the nation, of whom perhaps two-thirds may be of pure or mixed Choctaw blood. There are also some hundreds still remaining in Mississippi.

CHODKIEWICZ, kōd'kê-ā'vĭch, JAN KAROL (1560-1621). A Polish general. He took part in the campaigns against Wallachia, in 1602 received command of the Polish army in Livonia, and in 1605 severely defeated Charles IX. of Sweden near Kirchholm. Because of the lack of adequate funds, he was unable properly to follow up this victory, and in 1611 he concluded a truce with the Swedes. He was sent by Sigismund III. to Russia to prosecute the war there in behalf of the Pseudo-Demetrius, but, hampered by the disorganization of his army, was compelled to relinquish Moscow, and ultimately returned to Poland. He commanded in 1620-21 an army against the Turks. Consult the biography by Naruszewicz (new ed., Leipzig, 1837).

CHODOWIECKI, kō'dô-vĭ-ĕts'kê, DANIEL NIKOLAUS (1726-1801). A German painter and engraver, born in Danzig, West Prussia. At first a merchant in Danzig and Berlin, he afterwards studied painting in the latter city; was for a time a miniature-artist, but became chiefly successful as an engraver. He was appointed director of the Academy of Plastic Arts in Berlin in 1793. He executed about three thousand engravings, of which the best are genre studies of everyday life. Admirable plates were prepared by him for Lessing's *Minna von Barnhelm*, Gellert's *Fabeln*, Schiller's *Räuber*, and German versions of *Don Quixote* and several plays of Shakespeare. Fine specimens of his work are "The Departure of Jean Calas," and "General Zieten Remaining Seated in the Presence of the King." The Berlin Museum contains two unimportant pictures in oil, and the Berlin Academy a number of wash and pen-and-ink drawings. Consult: Engelmann, *Chodowieckis sämtliche Kupferstiche* (Leipzig, 1857; supplement, 1860); and Meyer, *Chodowiecki, der Peintre-Graveur* (Berlin, 1887).

CHODZKO, kōdz'kô, LEONARD JAKOB (1800-71). A Polish historian, born at Oborek (Government of Vilna). After study at the University of Vilna, he traveled with Prince Michael Cleophas Oginski (1765-1831), who had commanded a regiment in the insurrection of 1794. Having taken up residence in Paris, he received the appointment of adjutant to the Marquis de Lafayette because of his activity in connection with the July Revolution (1830). During the insurrection of 1863-64 in Russian Poland, he was agent at Paris of the Revolutionary Government. His publications include *Observations sur la Pologne et les Polonais* (1827), designed as an introduction to Ozinski's *Mémoires sur la Pologne et les Polonais depuis 1788 à 1815* (Paris, 2 vols., 1826), and *La Pologne historique, littéraire, monumentale et pittoresque* (2 vols., 1835-37; 8th ed., 3 vols., 1854-57).

CHŒNIX, kē'nĭks (Lat., from Gk. χοῖνιξ, *choinix*). A Greek measure of capacity, varying in size under different standards. In Athens, according to the system introduced by Solon, it was equivalent to 4 cotylæ (cotyle=0.27 liter), 1.08 liters, 1.14 quarts. In the later Athenian system, established about B.C. 100, the cotyle was equivalent to 0.2047 liter, the chœnix to 6 cotylæ, 1.228 liters, 1.297 quarts.

CHOËPHORI, kō-ĕf'ō-rī, THE. The second tragedy of the Orestan trilogy by Æschylus (q.v.).

CHŒRILUS, kēr'ĭ-lŭs (Lat., from Gk. Χοιρίλος, *Choirilos*). An Athenian dramatist of the late Sixth and early Fifth centuries B.C., the rival of Pratinas, Phrynichus, and Æschylus. Tradition says that he was preëminent in satyric dramas. The lexicographers attribute to him 160 plays in all, and report that he won thirteen victories, but scholars regard the number as too large. It has been conjectured that he was the first to reduce tragedies to writing.

CHŒRILUS OF SAMOS (c.470 B.C. - ?). The author of an epic poem called the Περσηΐς, *Persēis*, or Περσικά, *Persika*, descriptive of the Persian wars. He was a friend of Herodotus and of Lysander the Spartan, and latterly we find him at the Court of Archelaüs of Macedonia. Turning from the old mythology, he was the first epic poet to choose his subject from the history of the time. His work received the honor of public recitation together with the poems of Homer, and was admitted to the Epic Canon, later to be ejected by the grammarians of Alexandria. The fragments are included in Kinkel, *Epicorum Græcorum Fragmenta* (Leipzig, 1878).

CHOG'SET. See CUNNER.

CHOIR, kwīr (older forms *quire, quier, queer;* modern spelling affected by Fr. *chœur*, Lat. *chorus*, from Gk. χορός, *choros*, whence the word is derived). Strictly speaking, the choir is the part of the church occupied by the singers, wherever that may be; but at different periods in church architecture it came to designate two distinct sections: (1) In early churches, the part midway between the upper end or sanctuary, occupied by the higher clergy, and the lower end, or nave and aisles, occupied by the laity; (2) in mediæval and later churches, the entire upper end of the church, including high altar and apse, to which the singing had been transferred. The ritualistic sense, however, does not always agree with the architectural; for we speak of the choir of a cathedral, meaning the entire upper end, beyond the transepts with its aisles or chapels, regardless as to whether the singing is done there or not. In early basilican churches the upper end is called *apse*, and not choir, and the choir, as in San Clemente in Rome, is the space below the high altar, extending part way down the nave and slightly raised above its level, surrounded by a decorative parapet within which are marble benches for the singers, with a pulpit on each side and a paschal candlestick. This kind of choir is less a part of the architecture than of the ritualistic furniture and ornament. But, when monasticism gained complete control of church architecture in the Eighth Century, the old distinctions between higher and lower secular clergy no longer obtained, the division between choir and sanctuary lapsed, and the entire upper end became the choir. As the monks were numerous, and on the mediæval theory the worship of God was the primary consideration, the edification of the laity being secondary, the size of the choir increased and the choir-screen, shutting off the monks and the services from the laity in the lower part of the choir, was made lofty and heavy. Only when episcopal power returned and with it cathedral architecture and numerous lay congregations, in the Eleventh and Twelfth centuries, was this segregation of the choir partly broken down and some return made to early Christian custom. But the monastic custom of high choir-screens was retained in many cathedrals, especially in England, where they entirely separate nave and choir, attendants upon the services being usually seated within the latter. In England the term 'chancel' is used to designate the upper end of churches without canons—e.g. parish churches. Ordinarily, architects distinguish an apse from a choir in the sense of using the latter only when there is a considerable projection beyond the transept or nave. This projection often includes a certain straight portion, as a continuation of the nave and aisles; then a semicircle with projecting choir-chapels and choir-aisles. For the æsthetic significance of the development of the choir in mediæval churches, the varieties of its form in different schools, see ARCHITECTURE.—Choir is also the name given to the singers of the choral service.

CHOIR-SCREEN, or **CHOIR-WALL.** The screen or wall which divides the choir and presbytery from the side aisles. It is often very richly ornamented.

CHOISEUL, shwä'zēl', CLAUDE ANTOINE GABRIEL, Duc de (1762-1838). A French soldier and politician. He was a colonel of dragoons during the French Revolution, and warmly supported the royal cause. He was one of those who arranged the flight of Louis XVI. in 1791, but, the royal party having been captured, a price was set upon his head, and he was finally taken prisoner and confined at Dunkirk. He soon escaped, but was recaptured and was condemned to death. He escaped death, however, and at the Restoration received a seat in the House of Peers from Louis XVIII. In the Revolution of 1830, he was a member of the Provisional Government, and afterwards he was appointed by Louis Philippe to the offices of governor of the Louvre and royal aide-de-camp.

CHOISEUL-AMBOISE, shwä'zẽl' äN'bwäz', ETIENNE FRANÇOIS, Duc de (1719-85). A French statesman. He fought bravely in the War of the Austrian Succession, but did not attain any prominence until later, when his attractive bearing and disposition won for him the favor of Madame de Pompadour, and as long as she lived his advancement was continuous and regular. He was made lieutenant-general in 1748. In 1756 he was sent as ambassador to Rome, where he adjusted with Pope Benedict XIV. the dispute over the sacraments. In the same year he went to Vienna, intrusted with the mission of uniting Austria with France against Prussia. After accomplishing this he was made Minister of Foreign Affairs (1758) and created Duc de Choiseul (he had formerly been Count Stainville). He was the author of the *Pacte de famille*, which in 1761 brought about the alliance of all the Bourbon crowns against foreign aggression. His popularity with the Court and the nation was increased when in 1763 he secured terms of peace for France, which, though humiliating, were far better than the French dared to hope for. His reputation was enhanced by his success in suppressing the Jesuits, whom Madame de Pompadour had come to hate no less than did the nation. His patroness died in 1764, but Choiseul continued to direct both the internal and external affairs of France. He was a skillful courtier and shrewd diplomatist, and so controlled the intrigues of European courts that Catharine II. of Russia gave him the name *le cocher de l'Europe* ('the Coachman of Europe'). In 1768 he brought Corsica under French dominion. In 1770 Madame du Barry caused his dismissal. He lived magnificently in Chanteloup and (under Louis XVI.) in Paris. He died May 7, 1785. Consult: *Mémoires de Choiseul* (2 vols., Paris, 1790); Boutry, *Choiseul à Rome* (Paris, 1895); Broglie, *L'Alliance autrichienne* (Paris, 1895).

CHOISEUL-GOUFFIER, g͞oo'-fyȧ', MARIE GABRIEL AUGUSTE FLORENT, Comte de (1752-1817). A French diplomatist and archæologist. In 1776 he visited Greece and made a careful study of the whole country. His investigations resulted in the magnificent work *Voyage pittoresque de la Grèce* (1782-1824). He became a member of the French Academy in 1784, and two years later he was sent as ambassador to Constantinople, where he remained eight years. During the Revolution he adhered to the royal cause, and afterwards went to Russia, where he was made director of the imperial libraries and of the Academy of Fine Arts. He returned to France in 1802, and under the Restoration was Minister of State. He was a life-long friend of Talleyrand.

CHOISEUL-PRASLIN, -prȧ'lăN', EUGÈNE ANTOINE HORACE, Comte de (1837—). A French politician. He served in the navy from 1853 to 1865, held some minor offices, and in 1869 was elected to the Corps Législatif. In 1871 he was chosen to represent Seine-et-Marne in the National Assembly. He was elected to the Chamber in 1876, 1877, 1881, and 1889. From March to November, 1871, he was Minister Plenipotentiary of France to Italy, and in 1880 was appointed Under-Secretary of State in the Ministry for Foreign Affairs. In 1887 he was dispatched on a botanical mission to Ceylon and the United States. He has been regarded as very influential in the Republican majority.

CHOISY-LE-ROI, shwä′zē′le-rwä′, or **CHOISY-SUR-SEINE**, sụr-sân′. A town in the Department of Seine, France, on the river Seine, 6 miles southeast of Paris. It owes its importance to Louis XV., who built a pleasure château here, the remains of which are now occupied by a porcelain factory. The church and the town hall also were built in the reign of Louis XV. Among its monuments is a bronze statue of Rouget de l'Isle, author of the *Marseillaise*, who died here in 1836. The industries comprise textile, porcelain, and glass factories. Population, in 1901, 11,281.

CHOKE, General Cyrus. A character, or caricature, in Dickens's novel *Martin Chuzzlewit*. He is an American citizen, and "one of the most remarkable men in the country." Martin meets him on his visit to the United States and is inveigled by him into a ruinous land speculation.

CHOKE-BORE. A shotgun (q.v.) whose bore is slightly narrowed toward the muzzle in order to concentrate the shot.

CHOKE-CHERRY (so called on account of its astringent fruit). A name given to those species of the genus *Prunus* of which the fruit is astringent. They are comprised in the section *Padus* of the genus *Prunus;* they are natives of North America and have small fruit that hangs in racemes. The true choke-cherry is *Prunus Virginiana*, which is a shrub or small tree. Closely allied to it is the wild black cherry, *Prunus serotina*. This is an important forest tree, 60 feet high, and ranging over the United States from Maine to Florida and west to the Dakotas and Texas. It is a handsome tree and its wood is one of the most valuable of American woods for cabinet-work. It has a considerable resemblance to the Portugal laurel, although the leaves are deciduous. The bark is used as a febrifuge, pectoral, and tonic, under the name of wild-cherry bark: and by distilling it with water, a volatile oil is obtained from it associated with hydrocyanic acid, called oil of wild cherry. This bark allays nervous irritation, and is particularly suitable as a tonic. See Wild Cherry.

CHOKE-DAMP. See Carbonic-Acid Gas.

CHOKED DISK. See Optic Neuritis.

CHOKING. The obstruction of the throat, larynx, windpipe, or œsophagus by morsels of food or foreign bodies so that breathing is limited or prevented. Choking commonly causes coughing, redness of the face, dribbling of the saliva, etc., and may sometimes cause convulsions and death. Relief is obtained by dislodging the blocking substance by a blow on the back (which causes an expiration of some force), by an emetic, as apomorphia, administered hypodermically, by removal with a forceps, coin-catcher, or probe, or by pushing the obstruction down into the stomach with a sound or sponge-probang. A foreign body may be so firmly lodged in the throat, œsophagus, or bronchus as to necessitate cutting into the œsophagus or trachea and then using a forceps.

CHOLAGOGUE, kŏl′å-gŏg (Gk. χολαγωγός *cholagōgos*, from χολή, *cholē*, bile + ἀγωγός, *agōgos*, bringing, from ἄγειν, *agein*, to carry). An old term for a cathartic medicine which increases the flow of bile. Cholagogues act either by promoting the secretion of bile, or by facilitating the flow of bile from the gall-bladder into the duodenum.

CHOLERA, kŏl′ê-rå (Lat., from Gk. χολέρα, *cholera*, the cholera, from χολή, *cholē*, gall, bile). A term applied to four different diseases known, respectively, as *cholera morbus*, *cholera nostras*, *cholera Indica* (or Asiatic cholera), and *cholera infantum*. An account of the last-named disease is given in a special article. The others may be briefly described in the present sketch.

Cholera Morbus. This is a rarely serious attack of gastro-enteritis, characterized by vomiting, diarrhœa, cold surface, anxious or even faint feeling, cramps in the abdomen, and some prostration. It is caused by eating indigestibles or overloading the stomach, by excessive drinking of ice-water, exertion or exposure immediately after eating, etc., and usually occurs in the summer. In adults the treatment consists in emptying the digestive tract, then giving opium and carminatives, and resting the alimentary canal for several hours.

Cholera Nostras. This is a diarrhœal disease which has appeared in various parts of Europe, sometimes in epidemic form, since the days of Hippocrates. The name was adopted after Asiatic cholera appeared and invaded Europe, to distinguish it from the latter disease. Cholera nostras resembles cholera morbus except that the invasion is less sudden, the pains are more severe, and the prostration is more pronounced. Cramps occur in the legs, fingers, and arms, the skin becomes blue, and delirium or convulsions occur. Death is rare except among the aged, children, and invalids. No one cause can be named for it. The ordinary and normal intestinal bacteria (*Bacillus coli communis*) have been found in the fæces, but not the spirilla. The disease is not frequent in the United States, unless it be considered identical with the severer forms of cholera morbus. The term is but rarely used by American physicians. During an epidemic of true cholera, it is difficult to differentiate cases of cholera nostras, except by the absence of the spirilla in the dejections. In treating cholera nostras the digestive tract should be emptied by washing out the stomach and by using purgatives; the rectum should be irrigated with large quantities of hot tannin solution; the patient should take a hot bath and be warmly covered; the heart should be supported by proper medication. The attack may last several days, and is usually followed by considerable weakness and digestive disturbances.

Cholera Indica, or Asiatic Cholera. This is an infectious disease caused by drinking water contaminated by the fæces of other cholera patients, and containing the *Spirillum choleræ*. It is probably never communicated by contagion, that is, through the breath, perspiration, or other emanation from the patient. The disease originated in India, where it is endemic. Its permanent home is Calcutta and the southern part of Bengal. It has existed since 1817 in endemic form, and epidemics of it antedate the Christian era. Cholera first appeared in China in 1820; in Arabia, Persia, and Mesopotamia in 1821; in Syria, Palestine, and on the shores of the Caspian in 1823. The second epidemic, starting from the Ganges in 1826, passed through Persia and Astrakhan to Russia in 1830, and to Poland in 1831. Meanwhile it extended through Mesopotamia, Arabia, Palestine, and Egypt, and from Russia it passed into Germany. After invading Austria, Hungary, Wallachia, and Turkey, it reached England in 1831. Brought by Irish immigrants to Quebec in 1832, it entered the United States by way of Detroit, Mich., and thence it spread through the West to the Pacific Coast and south to New Orleans. Subsequent epidemics occurred in 1841, 1863, 1871, 1883, 1891, and 1893. The disease prevailed in America in 1848 and 1852, and from 1865 to 1868. It appeared in New Orleans and the valley of the Mississippi River in 1873, and in 1892 a few cases came to the port of New York from Hamburg, Germany. In 1899 it was found by the United States troops in the Philippine Islands, where it has probably been often prevalent.

Most cases of cholera begin with nausea, restlessness, and chilly sensations, followed by violent and frequently recurring diarrhœa, with vomiting and vertigo. In from one to six hours buzzing in the ears, palpitation of the heart, pressure over the stomach, an anxious, gray face, and blueness of the whole surface supervene. The bowels are emptied, painlessly, of discharges resembling rice-water. Pain in the stomach and in the region of the heart is often severe, and cramps occur in the calves and arms. The patient suffers continually from thirst. The temperature remains about 95° F., and the pulse rarely exceeds 100, while the respiration is usually increased to 30 or 40. Urine may be suppressed. The patient may sink into a somnolent and then a comatose condition and die, or else he may suddenly improve, and then either go on to convalescence or sink into fatal coma in a few days. Of the mild cases, about 50 per cent. die; while of those with subnormal temperature, cyanosis, and coma, 90 per cent. die. A mild form of true Asiatic cholera, known as *cholerine*, is rarely fatal, but is dangerously infectious. Lobar or lobular pneumonia, enteritis, nephritis, and neurasthenia may follow cholera.

Asiatic cholera is due to a slightly curved bacillus which, from its shape, is called the comma bacillus (*Spirillum choleræ Asiaticæ*). The bacillus, discovered by Koch in 1883, is a short motile rod from one to two micromillimeters long. A number of such bacilli are often found clinging to one another at their ends, and thus forming spirals of various lengths. The bacillus grows in the presence of oxygen, and does not produce spores, the temperature best adapted to its growth being about that of the human body. It is, however, quite resistant to cold, though it is readily destroyed by drying or boiling. Its definite biological characteristics usually enable an expert to determine its pressure or absence in intestinal evacuation even at the earliest stages of the disease. The bacilli are usually confined to the intestines, and during the active stages of the disease may be present in enormous numbers. The systemic effects seem to be due to absorption of toxins produced by the bacilli and are of the nature of a toxæmia. There are no pathological changes which are characteristic of the disease, and an autopsy shows those degenerative changes which usually accompany acute infection. In the small intestines, where the bacteria are usually present in the largest numbers, there are apt to be hemorrhages into the mucous membrane and a more or less intense congestion. The lymph follicles of the intestines are apt to be swollen and congested. The contents of the intestines may either consist of the characteristic rice-water fluid, or else may be dark-colored and bloody.

Patients suffering from cholera should be thoroughly isolated. Suspicious cases, too, should be isolated as soon as possible, and their dejections should be subjected to a careful bacteriological examination. The vessels receiving the dejecta should contain a 5 per cent. solution of carbolic acid, and should be cleansed with boiling water after being used. The bedding and clothing of the patient should be disinfected by steam, or soaked for one hour in a 5 per cent. solution of carbolic acid. The room used should be scrubbed with a similar solution, and all loose articles should be either burned or sterilized by steam or by formaldehyde vapor. Bodies of the dead should be promptly wrapped in a close sheet saturated with bichloride of mercury or carbolic acid solution, and buried at once. Nurses, physicians, and undertakers should disinfect their hands, faces, and clothes with the greatest care. According to a rule adopted in the United States and in Germany, all patients arriving from infected districts should be quarantined five days; if cases of cholera have broken out among them, the quarantine must be extended a week longer. As further preventive measures in time of danger, all water used for drinking or for washing table-ware should be boiled, and all fruit, ice, and milk should be carefully inspected.

The treatment of cholera consists in supporting the patient by opium, astringents, stimulants, heat, etc. Some success has followed flushing the rectum with salt solution, and subcutaneous injections of the same. Anti-cholera inoculation has been used with considerable success, according to Haffkine's method. Artificial immunization is secured by subcutaneous injection of cultures of diminished virulence followed by injections of cultures of increased virulence. In a series of experiments with Haffkine's cholera serum, made in Calcutta in 1900, where cholera has been especially fatal among the coolies employed by tea-planters, the results were as follows: Of 654 uninoculated, 71 deaths; of 402 protected with anti-cholera inoculation, 12 deaths. Thus the proportion is 3.63 to 1, and the reduction of mortality shown is 72.47 per cent. See Serum Therapy. Consult Wendt, *Treatise on Cholera* (New York, 1898).

CHOLERA INFAN'TUM (Lat., the cholera of children). A term used to designate choleriform diarrhœa in children. The disease is comparatively rare and of infectious origin. Strikingly similar to Asiatic cholera, it is caused mostly by feeding impure milk. Generally the disease follows an ordinary mild diarrhœa of a few days' or weeks' duration, but in some cases death ensues within a few hours of the beginning of the illness. The symptoms are due to the specific poison of the disease acting upon the heart, the nerve-centres, and the intestinal vasomotor nerves. The following are the most important symptoms: Prostration, steady rise of temperature to 103° F., or even to 108° F., almost constant vomiting of food, serum, mucus, and bilious material; twelve to fifteen passages from the bowels each day, first of green, yellow, or brownish color, later of colorless serum, in most cases odorless, in some few instances overpoweringly offensive; rapid emaciation and loss of weight; depressed anterior fontanel, sunken eyes, sharp features, a peculiar pallor and an anxious expression; nervous irritation and moaning or crying; dullness, stupor, relaxation, and coma or convulsions; rarely delirium. The disease is fatal in two-thirds of the cases, and almost all cases occur in bottle-fed children of the poor, during the first or second summer of their lives. Unless the disease is attacked in its earliest stages, the treatment is very unsatisfactory. It may consist in stomach-washing and intestinal irrigation, in early hypodermic injection of morphine, injection of saline solution into the cellular tissues to the amount of a half-pint in twelve hours, giving graduated baths and ice-water enemata to reduce the temperature, and administering stimulants. If the treatment is successful and the vomiting ceases, the patient may take cold whey, barley water, and albumin water, followed after twenty-four hours' rest by the breast for from two minutes to five minutes. The term *cholera infantum* is also sometimes used, inaptly, as a synonym for gastro-enteritis (q.v.).

In 1902 C. W. Duval and V. H. Bassett discovered and isolated the bacillus which causes the summer diarrhœas of infants. Their investigations have been verified by Drs. W. H. Welch and James H. M. Knox, of Baltimore, Md., where the discovery was made. They find this bacillus to be identical with *Bacillus dysenteriæ* (Shiga), which has been isolated in acute dysentery in adults by Shiga of Japan, Flexner and Strong in the Philippines, Kruse in Germany, and Vedder and Duval in the United States. It was not found in the stools of healthy children, nor of those suffering with simple diarrhœa. Consult Holt, *Diseases of Infants and Children* (New York, 1879).

CHOLESTERIN, kô-lĕs′tĕr-ĭn (from Gk. *χολή*, *cholē*, bile + *στερεός*, *stereos*, solid), $C_{26}H_{41}OH.H_2O$. A white crystalline substance occurring as a normal constituent in cell-protoplasm. It is therefore widely disseminated in both the animal and vegetable kingdoms. It is found in considerable quantities in the nerves and the white matter of the cerebro-spinal axis, and also occurs in milk, in the blood, and the bile, and is the main constituent of gall-stones, from which it may be readily prepared by extracting with boiling water and dissolving in hot alcohol. On cooling, the alcoholic solution thus obtained deposits cholesterin in somewhat impure form; the substance is then purified by recrystallization from alcohol. Cholesterin crystallizes in glittering nacreous scales, melting at 145° C., and boiling at 360° C. Chemically it is a monatomic alcohol. When its solution in chloroform is shaken with strong sulphuric acid, the solution assumes a blood-red coloration, which gradually changes to blue, green, and finally yellow. Cholesterin is insoluble in water.

CHOLET, shô′lā′. A town of France, in the Department of Maine-et-Loire, on the right bank of the Maine, 37 miles southwest of Angers (Map: France F 4). It has manufactures of linen, cotton, and woolen goods, including batiste and flannel. There is also a brisk trade in lumber, grain, and cattle. Population, in 1901, 15,335. Here, during the Vendean War, two actions were fought in 1793, in both of which the Royalists were decisively defeated.

CHOLIAMB, kō′lĭ-ămb. See VERSIFICATION.

CHOL′LUP, MAJOR HANNIBAL. One of Dickens's American characters in *Martin Chuzzlewit*, who is expert at 'cal'clating' his distance—in spitting—"a splendid example of our native raw material, sir." A type of the 'half-horse, half-alligator' American of the raw Southwest.

CHOLMONDELEY, chŭm′lĭ, MARY (?—). An English novelist, born at Hodnet, near Condover in Shropshire, daughter of the rector there. As a girl, she was delicate, and her education was largely directed at home by her father. Owing to the ill health of her mother, Miss Cholmondeley, when only sixteen years old, took charge of the household and much of the parish work. At this time she wrote her first three novels at odd hours. In 1896 her father's health broke down, and the family removed to London. Her novels comprise: *The Danvers Jewels*, under the pen-name of 'Pax' (1887); its sequel, *Sir Charles Danvers* (1889); *Diana Tempest*, the first novel to appear under her name (1893); *The Devotee* (1897); *Red Pottage* (1899); and *Love in Extremes*, a series of short stories (1902). Beginning with a detective story, Miss Cholmondeley has worked her way into the novel of contemporary life. She possesses humor and pathos, and usually keeps a firm hold on her characters; but a tendency to melodrama prevents her work, in spite of its popularity, from being wholly admirable.

CHOLULA, chô-lōō′lȧ. An old town of Mexico, in the State of Puebla, situated at an altitude of nearly 7000 feet, about 15 miles northwest of Puebla, with which it is connected by rail (Map: Mexico, K 8). It is well built and contains a pyramid of clay and brick supposed to have been built by the aborigines in honor of one of their deities, and surmounted by a half-ruined chapel, probably erected by Cortes. Cholula at the time of Cortes was a flourishing city of 20,000 houses and a large number of temples. It was the chief city of a semi-independent State settled by a tribe of the Nahuatl race. The inhabitants carried on a considerable trade and had a more or less democratic form of government. It was visited by Cortes in 1519, and in spite of his friendly reception by the inhabitants, he massacred a number of them, suspecting them of plotting against the Spaniards. The population of Cholula is about 9000.

CHONDROPTERYGII, kŏn-drŏp′tĕr-ĭj′ĭ-ī (Neo-Lat. nom. pl., from Gk. *χόνδρος*, *chondros*, cartilage + *πτερύγιον*, *pterygion*, fin), or ELASMOBRANCHII. A group of cartilaginous fishes, including the sharks, rays, and chimæra. See FISH.

CHONDROSTEI, kŏn-drŏs′tê-ī (Neo-Lat., from Gk. *χόνδρος*, *chondros*, cartilage + *ὀστέον*, *osteon*, bone). An order of fishes within the group Teleostomi, which includes the sturgeons and closely allied forms. See STURGEON.

CHONDROSTEUS, kŏn-drŏs′tê-ŭs. A Jurassic fossil fish, the direct ancestor of the modern sturgeon, found in the Liassic beds of England. The form of the body is very similar to that of the sturgeon, and the skeleton differs only in the form and arrangements of the cranial bones and in the presence of a series of branchiostegal rays, which latter character is reminiscent of the Palæoniscidæ. The body was free from scales, except on the upper edge of the caudal fin, where thick rhombic scales like those of the sturgeon were present. The type species, *Chondrosteus acipenseroides*, was only 3 feet in length. Another species was about 6 feet long; and an associated genus, Gyrosteus, is known only by fragments that indicate for it a length of 20 to 25 feet. See STURGEON.

CHONEK, or **TZONEKA** ('men'). The name by which the Indians of Patagonia call themselves. They are of various tribes, all savage nomads, and constituting a distinct linguistic stock. They are noted for their large size, averaging, it is said, over six feet in height, and being built in proportion. By the Pampas tribes they are known as Tehuelche, 'southerners.'

CHONETES, kô-nē′tēz (Neo-Lat. nom. pl., from Gk. χώνη, *chōnē*, χοάνη, *choanē*, funnel, from χεῖν, *chein*, to pour). A genus of fossil Brachiopoda, of the order Protremata, which may be recognized by the semicircular outline of the much-compressed concavo-convex shell, and by the row of hollow spines on the upper margin of the hinge-area of the ventral valve. The outer surface of the shell is ornamented by radiating striations in most of the species, while in some Carboniferous species there is also a mesial fold and sinus. The species are mostly small, seldom exceeding an inch in transverse diameter. In America the genus appears first in the Silurian rocks, it attains its maximum evolution in the Devonian and Carboniferous, and it became extinct with the close of the Permian; thus it is a valuable index fossil for the Upper Paleozoic rocks. About sixty American species are known, and there is probably an equal number known from Europe and Asia. See BRACHIOPODA; DEVONIAN SYSTEM; CARBONIFEROUS SYSTEM.

CHONODENDRON, kō′nô-dĕn′drŏn. See CISSAMPELOS.

CHONOS ARCHIPELAGO, chō′nôs är′kĭ-pĕl′ȧ-gô. A group of islands aggregating 4700 square miles, off the west coast of Chile, extending from about latitude 44° to 46° S. and from about longitude 74° to 75° W. (Map: Chile, B 12.) Many of the islands are barren, and the total population is small, being chiefly Indians. Administratively the group belongs to the Province of Chiloé.

CHONS, kŏnz, or **KHONSU**, kŏn′sōō. An Egyptian deity worshiped at Thebes, where he had a special temple, built by Rameses III., at Karnak. Of his original character little is known. The sparrow-hawk was his sacred animal. Later he was associated with the two principal gods of Thebes—Ammon and Mût. He was called their son, and is usually represented as a child or youth, wearing the side lock, the badge of princely rank. As Ammon and Mût were solar deities, Chons, their child, had to take a lunar part, and he is therefore depicted bearing the moon on his head. This led to his identification with other moon gods—e.g. Thout. The Greeks identified him with Heracles, as son of Ammon-Zeus.

CHOPIN, shô′păN′, FRÉDÉRIC FRANÇOIS (1809-49). The greatest modern master of pianoforte composition. He was born at Zelazowa Wola, near Warsaw, Poland, March 1, 1809. The son of refined parents, his musical education began as soon as his predilection for music manifested itself. Adalbert Zwyny was his piano-teacher, and later he had lessons in composition from Joseph Elsner. When not quite nine years old he played in public a concerto by Gyrowetz. Boy-like, he thought more of his new collar than of the impression made by his playing. "Everybody was looking at it," was his remark to his mother. The father was a professor in the Warsaw gymnasium, and the family in comfortable circumstances. From the aristocratic social entourage of his younger years Chopin inherited the liking for fashionable society which was one of his characteristics. A delicate boy, he seems nevertheless to have enjoyed a jest, and he had a talent for mimicry which convinced his friends of later years (Liszt, George Sand, and Balzac among them) that he could have succeeded as an actor. He greatly admired Paganini, who visited Warsaw in 1829.

In August, 1829, he gave two concerts in Vienna. "My manner of playing greatly pleased the ladies," he wrote home. His first concert in Warsaw was given in March, 1830, and was followed by a second, the net receipts from both being $600, by no means an inconsiderable sum for a young pianist in those days. He had a love romance with Constantia Gladowska, a vocal pupil at the Warsaw conservatory, who, however, married a merchant. While giving concerts in Munich, in September, 1831, he heard of the Russian occupation of Warsaw. As a result he settled, in October of the same year, in Paris, which was his home for the remaining eighteen years of his life.

He had composed, but not published, several of his "Etudes," among them the great C minor, Op. 10, No. 12, sometimes called the 'Revolutionary,' because inspired by his wrath at the fall of Warsaw before the Russians; his first sonata; and his "F minor Concerto." The "Adagio" (said to be Constantia Gladowska set to music) and the "Rondo" had been publicly played by him. (It may be said, in passing, that the dates of publication of Chopin's works are misleading as to the years of composition. Most of them were composed much earlier.) During his life in Paris he was surrounded by men of genius and women at least of talent, among them Liszt, Heine, Berlioz, Mérimée, Meyerbeer, Balzac, Dumas, De Musset, Ary Scheffer (who painted his portrait, destroyed in Warsaw by Russian soldiers, in September, 1863), and George Sand. He made frequent public appearances as a pianist. His "E minor Concerto" he played in February, 1832. Mendelssohn was among those who applauded him. Kalkbrenner was eager to have Chopin study with him—on the mechanical side. Chopin by letter consulted his former teacher, Elsner, who wisely counseled against it, for fear it might impair his originality. Great delicacy and a singing quality of tone seem to have been the characteristics of his playing. His own virile pieces, as some of the "Polonaises," "Ballades," "Scherzos," and "Etudes," probably were beyond his physical powers. "Young man," he is reported to have said to a budding virtuoso who apologized to Chopin for having broken a string while playing the famous "Polonaise Militaire," "if I could play that 'Polonaise' as it should be interpreted, there would not be a string left in the piano." Dr. William Mason, in his

Memories of a Musical Life, repeats an anecdote related to him by Dreyschock and illustrating Chopin's delicacy of touch. Dreyschock and Thalberg had just left one of Chopin's concerts. After proceeding a short distance Thalberg suddenly began to shout at the top of his voice. Asked by Dreyschock what was the matter, he replied: "I have been listening to nothing but *piano*; I want a little *forte*."

The familiar anecdote that Liszt and Chopin changed seats at the piano while the lights were turned down, and that the listeners could not distinguish between their playing, is apocryphal. Not so, however, the story of the coolness between Chopin and Meyerbeer, and its cause. It resulted from Meyerbeer's claiming that the charming little "Mazurka," Op. 33, No. 3 (in C), was really in two-quarter instead of in three-quarter time. "Give it to me for a ballet and I will prove it to you in my next opera," were Meyerbeer's parting words to Chopin. The incident is related by De Lenz, who, in his *Great Piano Virtuosos of Our Time*, has given charming glimpses of Chopin as a virtuoso and as a teacher.

During the summer and early autumn of 1835 Chopin was in Germany. He met his father at Karlsbad, and in Dresden fell in love with and became engaged to Marie Wodzinski, whose brothers had been his schoolmates. Chopin thought of giving up Paris and settling near Warsaw after his marriage. But Marie's father objected to the engagement on the ground of Chopin's lack of means, and it was broken in 1837. In July of that year he made a trip to England of only eleven days, but this sufficed to develop the germs of consumption latent in his constitution. (This disease was in the family. A sister died of it, and his father succumbed to combined chest and heart trouble.)

Chopin met George Sand in 1837. The liaison which resulted between them, and which she deftly turned into 'copy' in *Lucrezia Floriani* and *Histoire de ma vie*, seems to have begun to weary the 'polyandrous Sand' in 1844, and the final break occurred in 1847. Sand's descriptions of Chopin and his playing are of little value, because of their exaggerated note and rubbishy sentimentalism. She tells, for instance, of being delayed, while in Majorca, by a storm. On returning to her house she found Chopin at the piano. Terror-stricken by her absence in the storm, and dreading the danger to which she might be exposed, he had composed the tragic sixth prelude in B minor. Unfortunately for this pretty story, many of the preludes, this among them, were composed before Chopin went to Majorca. After his breach with Sand he wrote: "I have never cursed any one; but now I am so weary of life that I am near cursing Lucrezia. But she suffers, too, and more because she grows older in wickedness."

Chopin paid a second visit to England in April, 1848. He played with success. In January, 1849, he returned to Paris to die. He had so often been at death's door that, to quote Heller, when the news of his death came it was doubted. Kind women soothed his last days. Jane Stirling, a Scotch woman who had been his pupil and was in love with him (the two "Nocturnes," Op. 55, are dedicated to her), sent him 25,000 francs, for he was poor. His sister Louise, and his 'sisterly friend,' the Countess Delphine Potocka, were with him to the end. "She told me I would die in no arms but hers," he said, two days before he died, referring to Sand. His last utterance was "*Plus*," in answer to a question if he suffered. He died on October 17, and was buried in Père Lachaise, between Cherubini and Bellini.

Chopin is the emancipator of the pianoforte from the thraldom of the orchestral style of composition. He thought pianistically, and not orchestrally. Every tone color, every effect of which the instrument is capable, he divined. He placed pianoforte music definitely upon an independent basis. This is the reason why, although practically he composed only for the pianoforte, and almost wholly within smaller forms, he ranks among the great composers.

"I cannot create a new school, because I do not even know the old," he once said. But this very absence of conservative prejudice made him the leader of modern romanticism. An admirer of Bach and Mozart, he brought a marvelous insight into the laws of harmony, and a love of orderliness, as concerns form, to his work. He was one of the most adventurous of harmonists, reveling in chromatics and in other new and exquisite effects. Through his greatness and permanence he may be called the originator of the 'single-piece' composition, as distinguished from the suite or sonata. A Pole, his music is tinged with melancholy for his country's misfortunes. The "Mazurkas," which are among his most exquisite works, are flowers scattered over the grave of Poland. The "Nocturnes," developed from Field and marvelously enriched, are more personal and therefore sad in expression. Of the "Valses," graceful, vivacious, tender, Schumann said "the dancers should be countesses;" of the "Polonaises," they are "cannon buried in flowers;" of Chopin as a melodist, "he leans over Germany into Italy"—all concise and apt characterizations. In his comment on the "Valses," however, Schumann doubtless excepted the one that Chopin wrote after watching Sand's dog chasing its tail. Among his most beautiful compositions are the "Preludes."

Chopin's own delicate playing led to a style of Chopin interpretation in which the effeminate in his work was cultivated at the expense of the virile. The latter is found in the F minor "Fantaisie," and in plenty among the "Polonaises," the "Ballades," the "Scherzos," and the "Etudes." No modern pianist can afford to ignore this virile side of Chopin's work. He composed two concertos, not ranked among his greatest productions, yet which would be sadly missed; "Impromptus;" a very few pieces of chamber music; and songs.

Consult: Huneker, *Chopin: The Man and His Music* (New York, 1900), the standard life of Chopin, both as regards his personality and his work; Finck, *Chopin, and Other Musical Essays* (London, 1889); Karasowski, *Frédéric Chopin*, from the German by Emily Hill (London, 1879); Niecks, *Chopin as Man and Musician* (London, 1889); Liszt, *Life of Chopin*, translated by Cook (London, 1877).

CHOPINE, chô-pēn′ (from Sp. *chapin*, clog). A high clog or slipper, deriving its name, as is supposed, from the sound *chap, chop*, made by the wearers in walking. Chopines were of Turkish origin, but were introduced into England from Venice during the reign of Elizabeth. They were worn by ladies under the shoes, and were usually made of wood covered with leather, often of various colors, and frequently painted and gilded. Some of them were as much as half a yard high; and in Venice, where they were usually worn, their height distinguished the quality of the lady. Evelyn, in his *Diary* (1645), defines them as "high-heel'd shoes particularly affected by these proude dames, or, as some say, invented to keepe them at home, it being very difficult to walke with them."

CHOP'TANK RIVER. A river rising in Kent County, Delaware (Map: Maryland, O 5). It flows southwest through that State and Maryland, and becomes a wide estuary 20 miles long as it nears Chesapeake Bay, into which it empties. It is navigable for small vessels for about 40 miles.

CHORAGIC (kô-răj′ĭk) **MONUMENT** (from Gk. *χορανικός*, *choragikos*, choragic, from *χοραγός*, *choragos*, leader of the chorus, from *χορός*, *choros*, dance + *ἄγειν*, *agein*, to lead). The choragus, or person at Athens who, on behalf of his tribe, had supported the chorus (q.v.), and who, in competition with the other tribes, had exhibited the best musical performance, received a tripod for a prize; but he had the expense of consecrating it, and of building the monument on which it was placed. There was in Athens a whole street formed by these monuments, called the 'Street of the Tripods.' A fine specimen still remaining is 'the choragic monument of Lysicrates,' erected in B.C. 334, in honor of a victory with a chorus of boys. Consult Stuart and Revett, "Antiquities of Athens," I., *American Journal of Archæology*, VIII. (Baltimore, 1893).

CHORALE, kô-rä′lė (Med. Lat. *choralis*, from Lat. *chorus*, Gk. *χορός*, *choros*, dance, chorus). A melody to which hymns or psalms are sung in church by the congregation in unison. The Catholic Church service has from early times contained chorales, but the name is generally applied to those in the style introduced by Luther into the German Protestant Church in the Sixteenth Century. Realizing the great power of music to awaken religious emotion, he determined to carry his reforms into the music of the Church service, and to invigorate it with new life. He selected simple tunes from many sources, sacred and secular, and arranged them to fit the hymns and psalms used in the service. Some of the most attractive of the ancient Latin hymns were chosen—the chorale "Herr Gott, dich loben wir," is adapted from a song of praise by Saint Ambrose. German songs furnished material for many others.

The inspiration proved a great success; congregations everywhere joined heartily in singing the familiar melodies, and their religious interest took a new growth. The chorale became a popular form of composition, and many fine examples of this style were written during the Sixteenth and Seventeenth centuries. The most important of the early collections of chorales was the one published by Luther and his friend Johann Walther, in 1524, called the *Enchiridion*. Chorales were intended always to have an organ accompaniment, which was usually contrapuntal, and as time went on these accompaniments were made more and more elaborate by the organists, who found this a tempting field for display. Originally chorales were strongly rhythmical in character, with frequent alternations of duple and triple rhythm; and this, being in direct contrast to the droning, unrhythmical nature of the Gregorian chant, formed one of their greatest attractions. By a gradual process of change, however, this rhythmic element has disappeared, and chorales are now sung in notes of almost uniform length. German writers complain of this 'flattening-out' process, and regret the loss of character which has resulted. But even without its original rhythm, the fine simplicity and stately solemnity of the chorale render it an ideal form for the expression of religious fervor. Probably the most famous of all chorales is the one popularly accredited to Luther himself—"Ein' feste Burg ist unser Gott." This stirring tune has been incorporated into many compositions. It appears in one of Bach's cantatas, and in Mendelssohn's *Reformation Symphony;* is heard in Wagner's *Kaiser Marsch*, and forms an important theme in Meyerbeer's opera *Les Huguenots.*

Bach's works abound in beautiful chorales, and when these are sung by a large chorus the effect is wonderfully impressive and inspiring.

CHORAL (kō′r*a*l) **MUSIC.** Music written in parts, usually for four different voices, and performed by a chorus or choir. See ANTHEM; HYMNOLOGY.

CHORAL SOCIETIES. Associations of amateur singers formed for the purpose of performing large choral works are of comparatively recent date. During the Middle Ages, and down to the end of the Eighteenth Century, vocal works were performed exclusively by professional musicians, who composed the regular church choirs, or were attached to some royal or aristocratic chapel. Public concerts were of rare occurrence. The chief musical interest after the beginning of the Seventeenth Century was the opera. As operatic performances were prohibited during Lent, performances of oratorios and other works of a sacred character were instituted. With the growth of musical culture music-lovers were no longer satisfied with the few public performances, but met together for the purpose of studying concerted works. For the instrumental parts the services of professional musicians were enlisted. Although the absence of any high standards or lofty aims did not allow these early attempts of amateurs to reach a high degree of perfection, these meetings, nevertheless, did prepare the way for the establishment of choral societies with artistic aims. The sudden and rapid growth of instrumental music, beginning with Haydn and Mozart, and resulting in the perfection of the modern orchestra, also created a desire for a higher standard in the performance of vocal music.

The merest accident led to the establishment of the first permanent choral society, which is still in existence to-day and world-famous as the Berliner Singakademie. Karl Christian Fasch (1736-1800) had settled in Berlin as a singing-master. In 1783 Reichardt, at that time royal chapel-master, submitted to Fasch the score of a sixteen-part mass by Benevoli. In a spirit of rivalry Fasch at once set to work to compose a similar mass, which he attempted to perform with a chorus of twenty singers selected from the royal chapel in Potsdam. This attempt proved a failure, and the work was laid aside. Meanwhile the number of Fasch's pupils had increased considerably. Among these were the daughter and step-daughter of the Privy Councilor von Milow, who were so much interested in their teacher that they persuaded a number of fellow-students to form a little chorus for the purpose of performing Fasch's mass. This was in the autumn of 1790. During the winter the meetings were discontinued; but when, in the following spring, a meeting was called, twenty-seven members were present. A record of the meetings was then kept, and from the date of the first of these (May 27, 1791) the foundation of the Singakademie is reckoned. These singers entered heart and soul into the task they had undertaken, and when the mass had been successfully performed they did not disband, but decided to remain together under the able leadership of Fasch. In 1793 the society numbered forty-three members, and permission was obtained to hold their meetings in the Royal Academy of Science and Art. Fasch then formally organized the society. He retained absolute control over all musical affairs, while the administrative duties were vested in a board consisting of three men and three women. Each member paid twelve groschen a month, while the professional instrumentalists were exempt from dues in consideration of their services. At first the meetings of the society were strictly private. On April 8, 1794, a limited number of persons were invited, who were so much impressed with the excellence of the work done that a demand for public concerts was created. Accordingly, several concerts were given every season. Admission was only by invitation. When, in 1800, Zelter succeeded Fasch, a regular scale of admission prices was adopted. By that time the chorus of the society had increased to 115 voices. In 1802, the membership was 200; in 1813, 300; in 1827, 400; in 1833, 500. At present the membership is about 600. Among the proudest achievements of the Singakademie is the performance of Bach's *Saint Matthew Passion*, under the direction of Mendelssohn, in 1829.

In spite of the great success of the Berlin Singakademie, the other cities of Germany were slow to follow in the establishment of choral societies. Thirty years after the foundation of the Berlin institution only ten such societies were in existence. But after that one city followed another, so that to-day there is scarcely a single town which does not boast its choral society. In England choral culture was widely diffused through the growth of music festivals. Although originally the chorus at such festivals was recruited from the regular choruses of the churches, it was not long before the number of singers was considerably increased by the addition of amateur voices. To-day England surpasses all other countries in the excellence and efficiency of its choral societies. The history of English choral societies is practically that of the English Music-Festival, to which article the reader is referred.

In the United States choral societies enjoy the popular favor as much, and are cultivated almost as extensively, as in England. When the Pilgrim Fathers first landed they opposed the use of any kind of music in church; but gradually a more liberal spirit gained ground, so that not only was music introduced into the services, but schools of singing also were established. The aim of these was merely to teach the singing of simple hymns, but in 1724 a 'sacred singing school' was founded at Stoughton, Mass., and this, on November 7, 1786, became the Stoughton Musical Society. Now that a beginning had been made, other choral societies came into existence. Up to 1820 the choral societies in the United States exceeded in number those of Germany, but could not compare with them in the quality of the work done. With increased facilities of communication with the Old World, musical culture in America advanced step by step, so that in 1815 the Handel and Haydn Society was established in Boston. This institution became to the development of music in America what the Singakademie was in Germany—a model for all similar organizations. At its first concert, on Christmas Day, 1815, the chorus of the Handel and Hadyn Society consisted of one hundred members. Until 1847 the president of the society acted as conductor, and consequently the performances were rather crude, although marked by a spirit of earnestness. In that year a professional musician was elected as regular conductor. When, in 1852, Carl Bergmann assumed the leadership, the performances rose to a high level. But the present excellence of the society is due to the untiring and efficient labors of Carl Zerrahn, who directed the destinies of the organization from 1854 to 1895.

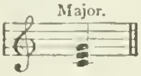
Shortly after the establishment of the Boston Handel and Haydn Society, a choral society bearing the same name was organized in New York. This, however, was short-lived, and in 1823 branched out into two rival societies—the New York Choral Society and the New York Sacred Music Society. The former of these began its career on a very ambitious scale, and soon was disbanded; whereas the latter rose to great importance, though it, too, came to an end in 1849. But as soon as one society disbanded another sprang up, so that New York was never without performances of choral works. This continued until 1873, when Dr. Leopold Damrosch founded the Oratorio Society. The first concert took place December 3, 1873, at which occasion the chorus numbered about sixty members. When Dr. Damrosch died, in 1885, his son Walter succeeded him as conductor. Under his direction the chorus increased to six hundred members. Another choral society of importance is the Musical Art Society, founded by Frank Damrosch in 1896. This organization is unique inasmuch as it consists exclusively of professional, trained singers. The purpose of this society is the performance of older church music of the Palestrina style. The People's Choral Union is a society founded by Frank Damrosch in 1892. It consists of over three thousand members, recruiting themselves from among the laboring classes. The organization has three classes of members—those constituting the elementary class, the advanced class, and the choral union proper. Any self-supporting man or woman may join the elementary class, where thorough instruction as to the proper use of the voice and the rudiments of music is given. From this class the pupils are promoted to the advanced class, whence, upon graduation, they pass to the choral union. The attendance at the various classes numbers about 2500, 450, and 1200 respectively. Meetings are held every Sunday, and once, in May, a public concert is given. Another important New York society, the Arion, was founded in 1854. By 1902 its membership had increased to 1200.

In the West, Cincinnati, Chicago, and Milwaukee are famous for their choral societies. Here chiefly the German element of the population forms male choruses. But there is no lack of mixed choruses, which meet yearly for a great singing festival. In making these festivals a means for the spreading of musical culture and intelligence, Theodore Thomas has been indefatigable. See MUSICAL FESTIVAL.

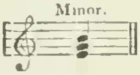
CHORASSAN, kō'rȧ-sän'. See KHORASAN.

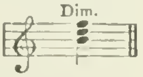
CHORAZIN, kō-rā'zĭn (Gk. Χοραζείν, *Chorazein*). A town in Galilee mentioned in Matthew xi. 21 and Luke x. 13. It was not far from Bethsaida and Capernaum, all three being in the region where Jesus passed a large part of his public ministry. It was condemned by him because of its refusal to repent. The site has been identified as that of the modern Kerazeh, in a small valley a short distance from the north end of the Sea of Galilee and west of the Jordan. Extensive ruins are to be seen here, showing the former importance of the town, which, however, is not mentioned in ancient writings outside the New Testament.

CHORD, kōrd (from Lat. *chorda*, Gk. χορδή, *chordē*, string of a musical instrument). A combination of two or more musical tones of different pitch, sounded simultaneously. In harmony, however, a chord must have at least three tones. All chords, when in their original positions, are seen to be made up of a series of diatonic thirds, erected above a fundamental tone or root. The *common chord* or *triad* is the basis of all harmony, and consists of a bass or fundamental tone, with its third and fifth above.



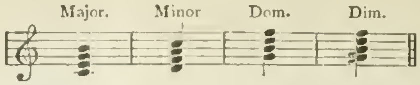
A *major triad* has a major third and perfect fifth. A *minor triad* has a minor third and perfect fifth, and a *diminished triad* has a minor third and diminished fifth.

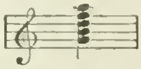


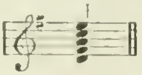


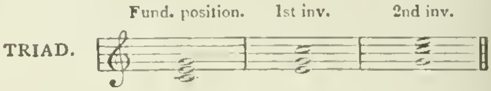
Chords of the seventh are four-note chords with the highest note an interval of a seventh above the bass note. There are major, minor, dominant, and diminished chords of the seventh. A *major seventh chord* has a major third, perfect fifth, and major seventh. A *minor seventh chord* is a minor triad with a minor seventh added. The *dominant seventh chord*, the most important and frequently used of the seventh chords, is erected upon the dominant (fifth degree) of both major and minor modes, and contains a major triad with a minor seventh. A *diminished seventh chord* contains a diminished triad and a diminished seventh, and occurs only upon the seventh degree of the minor mode.

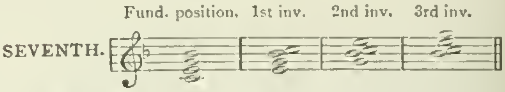
A *chord of the ninth* is a five-tone chord, formed by adding another third to a dominant seventh chord. A chord is said to be in its *fundamental position* when its root note is the lowest tone. An *inverted chord* is one whose position has been changed by setting its lowest tone an octave higher. Then the inverted chord may be again subjected to the process of inversion. It is evident that a chord has as many inversions as it contains intervals—i.e. a triad has two, a seventh has three, and a ninth has four inversions. This change of position makes a great difference in the effect of the chord, and entirely alters its harmonic 'value'; yet it is only the bass note that determines the inversion. The notes above it may be arranged in any order without affecting its character.

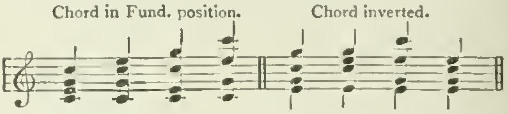












While chords in their primary form contain only thirds, it will be seen that by inversion, or by doubling one or more of the notes, other intervals are formed. *Consonant chords* are the triads and their inversions. All others are *dissonant chords*, containing one or more dissonant intervals, and require to be resolved into consonant chords to attain a point of repose. See CONSONANCE; DISSONANCE.

Broken chords are those which are separated so that the notes are played successively instead of simultaneously. The subject of chords, their treatment, and their figuration, is treated fully in any text-book on harmony; also, and with admirable clearness, in Lavignac, *Music and Musicians* (New York, 1899).

CHORDATA, kŏr-dā'tȧ (Neo-Lat. nom. pl., from Lat. *chorda*, chord). The phylum of the animal kingdom that embraces all the vertebrated animals — fishes, amphibians, reptiles, birds, and mammals, together with the Urochorda, or ascidians, and the Adelochorda, or Hemichorda (see BALANOGLOSSUS)—based upon the fact that all these have as a common feature a structure termed the notochord, although in some of the lowest it is present only in the very young condition. The notochord represents, and in the higher forms is replaced by, the spinal column. "Another nearly universal feature is the perforation of the wall of the pharynx, either in the embryonic or larval condition only, or throughout life, by a system of clefts—the bronchial clefts; and a third is the almost universal presence at all stages, or only in the larva, of a cavity or system of cavities, the *neurocœle*, in the interior of the body, lying above the central nervous system."

CHOREA, kō-rē′ȧ (Lat., from Gk. χορεία, *choreia*, dance), or Saint Vitus's Dance. A disease characterized by involuntary and irregular jerky movements of the muscles of the face, neck, chest, arms, hands, legs, feet, back, or abdomen. The movements occur when the person is performing voluntary motions, or when at rest but awake; they generally cease during sleep. Most cases occur in neurotic children between the ages of five and fifteen, and are caused by gout, rheumatism, fright, injury, or worry. The disease is a little over twice as frequent in boys as in girls. Often the attack begins by dropping articles, grimacing, stumbling, or winking. It may last from six weeks to six months, and relapses are frequent. The appetite is variable, and nutrition is impaired, with resulting anæmia. In about 90 per cent. of the cases fibrinous deposits are found on the walls of the heart. The seat of the trouble is in the brain and spinal cord, but there is no mental change in the patient, except slight emotional excitability. Chorea is rarely fatal in the United States. In England the mortality reaches 2 per cent. The treatment consists in rest from violent exercise and all mental exertion, cold sponging, nourishing food, iron, and arsenic, and a few other drugs, electricity, and change of air. One variety of chorea is hereditary; this is attended with progressive mental deterioration, and terminates in dementia. (See Insanity.) It is to be observed that the name Saint Vitus's dance (dance of Saint Veit) was applied originally in Germany to a different form of disease from that above referred to—one closely approaching in its characters the epidemic 'dancing mania,' which in Italy was called tarantism (q.v.). Consult Church and Peterson, *Nervous and Mental Diseases* (Philadelphia, 1901).

CHORE′A SCRIPTO′RUM, or Writer's Cramp. See Neurosis.

CHOREE, kō-rē′. The same as trochee (q.v.).

CHOREPISCOPUS, kō′rē-pĭs′kō-pŭs (Lat., from Gk. χωρεπίσκοπος, *chōrepiskopos*, from χώρα, *chōra*, place + ἐπίσκοπος, *episkopos*, overseer, bishop). An order of ministers of ancient origin, whose functions were to assist city bishops in rural districts or remote places. They acted in a subordinate capacity, and possessed limited powers, acting as colleagues or vicars of the bishops. They possessed the privilege of attending councils in their own right, and not merely as substitutes for bishops. At first they were confined to the Eastern Church, but began to multiply in the Western Church in the Fifth Century. They were succeeded after the Tenth Century by archdeacons, vicars-general, and rural deans. In the East the order continued to exist until the Ninth Century, when it was superseded by the exarchs.

CHORIAMBUS, kō′rĭ-ăm′bŭs. See Versification.

CHORLEY, chôr′lĭ. A market and manufacturing town of Lancashire, England, on the Leeds-Liverpool Canal, about 25 miles northeast of Liverpool (Map: England, D 3). It is a thoroughly progressive municipality. Since the incorporation, in 1881, it has obtained control of its gas-supply, and it maintains markets, slaughter-houses, and cemeteries. Its water is supplied by the Liverpool municipality. The ancient Norman parish church is worthy of notice. The manufacture of cottons, muslins, and calicoes constitutes the principal industry. Railway-cars are also made. In the neighborhood are stone-quarries and collieries. Population, in 1901, 26,900.

CHORLEY, Henry Fothergill (1808-72). An English author and critic. He was on the staff of the London *Athenæum* from 1833 to 1868. During most of that time his literary reviews, especially in belles-lettres, were numerous and important, and the entire direction of the musical department was in his hands. He wrote many librettos, and several novels, dramas, and poems, but was more successful as a critic and biographer. Among works separately published were: *Memorials of Mrs. Hemans* (1836); *Music and Manners in France and Germany* (3 vols., 1841); *Modern German Music* (1854); and *Thirty Years' Musical Recollections* (1862). His unfinished autobiography formed the basis of the *Autobiography, Memoir, and Letters,* edited by Hewlett (London, 1873).

CHOROGI, kō′rō-gĭ. See Stachys.

CHOROID (kō′roid) **COAT**. See Eye.

CHORON, shō′rôɴ′, Alexandre Etienne (1772-1834). A French writer on music. He was born at Caen, studied with Roze and Bonesi, and is said to have accumulated more information on the theory and practice of music than any French musician before him. As corresponding member of the Academy (1811), he undertook the reorganization of the *maîtrises*, or training-schools for church choirs, and was successively appointed conductor of religious festivals and director of the Grand Opéra (1816). In 1816 he reopened the Conservatoire, which had been closed in the previous year, under the name of the Ecole Royale de Chant et de Déclamation. In 1817 his appointment to the directorship of the Opéra was suddenly revoked, and he established the famous Conservatoire de Musique Classique et Réligieuse, which existed until 1830, and greatly promoted the musical instruction of the masses. Choron was a pedagogue of pronounced genius, who opened a new field to French musicians. His numerous works include: *Principes d'accompagnement des écoles d'Italie* (1804); *Introduction à l'étude générale et raisonnée de la musique*, a capital work, though unfortunately unfinished; *Méthode de plain-chant* (1818); *Manuel complet de musique vocale et instrumentale*, etc. (1836-38).

CHORRILLOS, chō-rē′lyōs. A bathing resort of Peru, situated on the Bay of Chorrillos, 7 miles south of Lima (Map: Peru, B 6). The town is a favorite summering place for the inhabitants of Lima. Population, 5000. It was the scene of a Peruvian defeat at the hands of the Chileans, January 13, 1881.

CHORUS, kō′rŭs (Lat., from Gk. χορός, *choros*, dance, chorus: connected with χόρτος, *chortos*, inclosure, Lat. *hortus*, garden, OIr. *gort*, crop, Ger. *Garten*, garden, Engl. *yard*). Among the early Greeks, a festal dance, accompanied by music. Through its development in the Attic theatre, the word came to mean particularly the group of dancing singers who took part in the rendering of a play, and was also applied to the parts of the composition itself which they performed. The primitive dithyrambic chorus of fifty voices in honor of Dionysus, supplemented by the addition of actors (see ARION; THESPIS), was in fact the source of the Greek drama.

In the time of the Attic tragedy the chorus consisted of twelve or fifteen persons, in character befitting the scene and nature of the plot, who usually made their entrance to the orchestra from the sides early in the play, and remained there before the stage throughout the performance. At pauses in the acting, the chorus, with an accompaniment of dancing movements, sang lyrical passages having reference suggestively to the subject and progress of the drama, and serving to heighten and solemnize the impression produced by the actors. Occasionally the chorus, in the person of its leader, called the coryphеus, participated briefly in the dialogue itself. The chorus has been thought to represent the attitude of the ideal spectator of the action, taking part with or against the persons on the stage by advice, comfort, exhortation, or dissuasion. At times the chorus was divided, and spoke or sang antiphonally. These divisions passed from side to side in movements from which originated the naming of the single songs or stanzas, such as strophe, antistrophe, and epode. Of the musical element in the composition of the ancient choruses little is known with any certainty. Possibly it was only a kind of rhythmic declamation, and very simple, though the metres of its verse are often complicated. It was accompanied by flutes in unison.

The charge of organizing the chorus was considered a great distinction among the people of Athens, being one of the public services (*λειτουργίαι*, *leitourgiai*) offered by rich citizens to the State. The person appointed for the purpose was called the *choragus*, and the one most successful in each competition was awarded a prize. The honor was expensive, as the choragus had to pay all the cost of training the chorus, besides feeding and lodging them and providing their masques and dresses.

In comedy, the chorus was somewhat more numerous than in tragedy, and was often fantastically adapted to the humor of the story, as, for instance, that in the *Clouds* and that in the *Frogs*, comedies of Aristophanes. Later comedy, however, gradually discarded the chorus, and with the decline of ancient tragedy the chorus fell into disuse. In recent times there has been some attempt, as in Schiller's *Bride of Messina*, to produce the chorus on the stage in the manner of the ancients; but the music that has been occasionally set to some of the Greek tragedies can give but slight idea of that which originally accompanied them. In general, by the term 'chorus' is understood a musical composition arranged to be sung by a considerable number of voices together; or the body of singers who collectively perform it, with or without instrumental accompaniment.

The musical chorus is the only artistic means by which a simultaneous movement or sentiment of a multitude can be represented in the drama, the language or text being always of a simple rhythm, permitting only of a limited movement suited to the combination of a multitude. It is, however, not always necessary that every part of the chorus should manifest the same feeling or sentiment. Two or more parts of the chorus may act against each other, as suits the purport of the drama. Double, triple, and quadruple choruses are found in the old Italian compositions for the Church. In opera (q.v.) the members of the chorus are generally entirely involved in the action of the play and realistically represent characters which figure in the *dramatis personæ*. Of modern operas, the chorus has been used with especial effect in those of Meyerbeer and Wagner. In oratorio (q.v.) the chorus is of the greatest importance, and the numbers now employed to sing the chorus far exceed anything attempted a century ago; this is not always an advantage, for the *tempi* must necessarily be taken much more slowly, which has a sluggish effect; while increase in the number of voices does not always produce a greater power of sound. The chorus of thirty-five well-trained voices from the Pope's chapel, which sang at the coronation of Napoleon I., in the Cathedral of Notre Dame, Paris, is said to have produced a far greater and more wonderful effect when they entered singing the *Tu es Petrus*, than another chorus of hundreds of voices, and eighty harps, that had been assembled and trained for the same occasion, in expectation of surpassing all that man could imagine. The greater the number, the greater is the difficulty in obtaining unity.—CHORUS, in organ-building, is the name given to stops of the mixture species, some of which contain 2, 3, 4, 5, 6, or more pipes to each note, tuned at consonant intervals in relation to the fundamental stops. Consult: Haigh, *The Attic Theatre* (Oxford, 1889); id., *The Tragic Drama of the Greeks* (Oxford, 1896); Donaldson, *The Theatre of the Greeks* (London, 8th ed., 1875); Mees, *Chorus and Choral Music* (New York, 1901).

CHOSE (shōz) **IN ACTION** (Fr. *chose*, thing, from Med. Lat. *cosa*, *causa*, thing, Lat. *causa*, cause). In the law of England, that kind of property which is founded not in possession, but in the legal right to possess. As this right can, in general, be vindicated and made available only by means of an action, the property to which it relates, whether real or personal, is called a thing (Lat. *res*, or Fr. *chose*) in action, to distinguish it from a thing already in possession. The right to recover money due on bonds and bills, and that to recover on goods bought and not yet delivered, are examples of choses in action, as is also the right to compensation for damages occasioned by breach of contract or by tort.

By the strict rule of the ancient common law, no *chose in action* could be assigned or granted over, because it was thought to be a great encouragement to litigiousness if a man were allowed to make over to a stranger his right of going to law. (See CHAMPERTY.) But this nicety is not now so far regarded as to render such a transaction really ineffectual. It is, on the contrary, in substance a valid and constant practice; though, in compliance with the ancient principle, the effect of assigning a chose in action is to confer on the assignee a power of attorney to prosecute the action in the assignor's name for the assignee's own benefit. The assignment has this effect in law, and not in equity alone, as is commonly stated. If, however, the assignor interfered with his assignment by collecting the chose in action, or otherwise, equity would protect the assignee's rights, provided the assignment was made for value. The King is an exception to this general rule, for he may always either grant or receive a chose in action by assignment. By the law merchant an indorser of negotiable paper could sue upon the paper in his own name. The law relating to *choses in action* was formerly the same in the United States as in England. But in many States, as in New York, the assignee of a chose in action is now allowed to sue upon his right in his own name, provided the chose in action is not a right to recover for personal injuries, such right not being assignable. The assignee of a chose in action, however, takes it subject to all defenses which might have been interposed to it had the action been brought upon it by the original owner. Choses in possession are commonly called chattels (q.v.). The branches of the law relating to choses in action are specifically treated under such titles as ASSIGNMENT; SPECIFIC PERFORMANCE; NEGOTIABLE INSTRUMENTS, etc. Consult the authorities referred to under CONTRACT; and for a discussion of the early English law upon the ownership of choses in action, consult Pollock and Maitland, *History of English Law* (Boston, 1899).

CHOSHI, chō'shē. A prefectural town of Japan, situated on the eastern coast of Nippon, 72 miles by rail from Tokio (Map: Japan, G 6). It extends for about 2½ miles along the river of Tonegawa, and has a temple situated on an eminence in the centre of the city. The chief occupation is the manufacture of fish-oil. Population, in 1898, 36,511.

CHO'SON'. See KOREA.

CHOSROES. See KHOSRU.

CHOTA NAGPUR, chō'tȧ năg-pōōr', or CHUTTA NAGPUR. A southwest division and political agency of Bengal, British India (q.v.). The division comprises the five districts of Hazáribágh, Ranchi, Palamau, Mánbhum, and Singhbum. It is sparsely inhabited, the largest towns not exceeding a population of 5000. Area, 26,963 miles. Population, in 1891, 4,629,000; in 1901, 4,899,000. The political agency comprises nine tributary States whose area is 16,054 square miles. Population, in 1891, 883,500; in 1901, 982,400. The region is mountainous and lies between the basins of the Ganges and its tributaries, the Sov and the Manahadi. It is largely inhabited by aboriginal tribes. Coal in considerable quantities is found, and some gold. Tea, rice, corn, potatoes, and oil-seeds are cultivated. The climate is dry and healthful.

CHOTIN. See KHOTIN.

CHOUANS, shoo'äN' (corruption of Fr. *chathuant, screech-owl*). The bands of insurgent peasants in Brittany and Maine, who, during the French Revolution, following the Vendeans, fought for the King. They were so called from Chouan, the nickname of their first leader, Jean Cottereau, smuggler and soldier. The species of mingled brigandage and warfare known as the *chouannerie* first broke out in 1793, after having been fomented assiduously by the priests and the agents of the royal family. After several exploits of the guerrilla sort, Cottereau was killed July 29, 1794, near Laval. Other leaders, however, appeared: Cadoudal, Désoteux, Charette, Puisaye. The pacification of La Vendée in 1795 gave Hoche an opportunity to crush the Chouans; but they sprang up again in 1799, and forced Napoleon to send against them Brune, with 30,000 men, who suppressed the rising. Eruptions of chouannerie continued till 1803, and it made its appearance once more in 1814-15. Consult: Beauchamp, *Histoire des Chouans* (Paris, 1806); Kérigant, *Les Chouans* (Paris, 1882); Moulin, *Mémoires sur la Chouannerie* (Paris, 1893).

CHOUGH, chŭf (AS. *cēo*, originally imitative of the bird's note). A small crow of the genus Fregilus, specifically the Cornish chough, or red-legged crow (*Fregilus graculus*), a widely distributed but very local and diminishing bird, inhabiting the high mountains of Europe, Persia, India, the north of Africa, and some parts of the British seacoasts, but almost exclusively confined to high cliffs. In these it generally makes its nests; sometimes, however, in ruined towers. Its long hooked claws enable it to cling easily to a rough rock, but it seems unwilling even to set its feet on turf. It lives in societies like the rook. It feeds on insects, berries, grubs, and grain. It is easily tamed, becomes very familiar and forward, and exhibits in the highest degree the curiosity, pilfering disposition, and delight in brilliant or glittering objects which also characterize others of the crow family. Other species of chough are known, one, the chocard or Alpine chough (*Fregilus alpinus*), being confined to the European Alps, and the others natives of Australia, Java, etc.

CHOUICHA, chou'ĭ-chȧ (Alaska). The quinnat (q.v.).

CHOULANT, shōō'läN', JOHANN LUDWIG (1791-1861). A German physician, born in Dresden. He studied in Dresden and Leipzig, and became connected with the clinics in Dresden, in which he was appointed professor of therapeutics in 1823 and director in 1828. Subsequently he acted for a number of years as head of the Academy. His published works include the following: *Lehrbuch der speciellen Pathologie und Therapie des Menschen* (1831 and several later editions); *Handbuch der Bücherkunde für ältere Medizin* (2d ed., 1841); *Bibliotheca Medico-historica* (1842); and *Die Anfänge wissenschaftlicher Naturgeschichte* (1856).

CHOUQUET, shōō'kā', ADOLPHE GUSTAVE (1819-86). A French writer on music, born in Havre and educated at the Institution Massin in Paris. He lived in the United States from 1840 to 1860, and then returned to Paris, where he twice won the *Prix Bordin* (1864 and 1868) for works on the history of music. He was appointed custodian of the collection of instruments in the Conservatory in 1871, and in 1875 published a catalogue of them. His *Hymne de la Paix* was the prize cantata of the Exposition of 1867. Of his literary productions the *Histoire de la musique dramatique en France depuis ses origines jusqu'à nos jours* (1873) is probably the most important.

CHOUSINGHA, chou'sĭng-hȧ (East Indian). The four-horned antelope (*Tetraceros quadricornis*) of India. It is a small brown species resembling the duikerboks, and distinguished by the buck having four short smooth horns upon the forehead. These animals are not gregarious, and conceal themselves in bushy places. See Plate of GAZELLES.

CHOUTEAU, shōō'tō, AUGUSTE (1739-1829). An American pioneer of French descent, born in New Orleans. Under the direction of Pierre Liguest Laclède he made the first settlement on the site of Saint Louis, Mo., on February 15, 1764. (See SAINT LOUIS.) He and his brother, Pierre, were well known as traders for many years in the West.

CHOUVACHES, chōō-väsh′ez. See TCHUVASHES.

CHOW-CHOW (strictly an adjective, meaning 'mixed,' 'miscellaneous,' 'broken': of unknown origin, usually considered pidgin-English). A name most commonly used to denote a kind of mixed pickles, made originally in the East Indies, but now imitated elsewhere. Among its principal ingredients may be mentioned cucumbers, onions, cauliflower, and beans, all of which are steeped in mustard. A kind of Chinese sweetmeats, consisting of odds and ends of orange-peel, ginger, bamboo-sirup, pumelo-rind, etc., is also called chow-chow.

CHOW CHOW. A Chinese domestic dog about the size of a modern Pommeranian, with so thick, plain, and even a coat that when it is pressed down by the hand it rises again, just as a close-wooled sheep's coat will do. It has one characteristic which differentiates it from all other dogs, a black tongue. Many dogs have black roofs to their mouths, but no chow chow is of the true breed that has not a black tongue. Two varieties have been exhibited at bench-shows, one all red, and the other all black. The chow chow made its first appearance in America at the Westminster Kennel Club's show in New York in 1901.

CHOWDER (Fr. *chaudière*, pot, caldron, Lat. *caldaria*, boiling pot, from *caldus*, *calidus*, warm, hot). In the fishing villages of Brittany, *faire la chaudière* is to provide a caldron in which is cooked a mess of fish and biscuit with some savory condiments—a hodge-podge contributed by the fishermen themselves, each of whom in return receives his share of the prepared dish. The French would seem to have carried this practice to America, first to Newfoundland, whence it spread to Nova Scotia, New Brunswick, and New England. Chowder is described nowadays as "a many-sided dish, of pork and fish, potatoes and bread, onions and turnips, well peppered and salted, piled up in layers and stewed together." The best-known form of chowder is *clam chowder*, so called because clams are the principal ingredient.

CHOY′A. See CHAY ROOT.

CHRESTIEN DE TROYES, krâ'tyäN′ de trwä (c.1145-1191). A French poet, the founder of the mediæval courtly romance. He was born in Troyes, and was attached to the Court not only of the Count of Champagne, his native district, but also to those of the neighboring principalities of Flanders and Hainaut. He is the most famous of the authors who developed the Arthurian romances in France, and expressed the spirit of the later chivalry, much more refined and approaching much more nearly modern ideas than the fierce and warlike epics of the Charlemagne cycle. Arthur's Court, in his hands, becomes a civilized and brilliant gathering, modeled after those with which the poet was familiar. In fact, though finding his subjects in the fantastic and ideal legends of an earlier age, he treats them most successfully when he deals with details of every-day life, which he renders with the fidelity of a modern novelist, delighting in the reproduction of scenes of pomp and ceremony to please the aristocratic society for whom he wrote. It is probable, though the whole subject is full of controversy, that to the novelist's instinct of Chrestien is due the rounding out and completion of what we may call the plot of the Arthurian story, in which case a very high place must be assigned to him among the romancers of the world. From his working in of the Grail legend (see GRAIL, THE HOLY) in his huge romance of *Percevale le Gallois* (ed. Potvin, 6 vols., Mons, 1866-71), which with its continuations by other hands extends to 63,000 lines, sprang the great epic of Wolfram von Eschenbach (q.v.) which furnished Wagner with the material for the libretto of *Parsifal.* His other main works, in the best editions, are *Erec et Enide* (Förster, Halle, 1896), *Yvain* or *Le Chevalier au Lyon* (id., Halle, 1887): *Le Chevalier à la Charrette* (Jonckbloët, The Hague, 1850; Förster, Halle, 1899); and *Cligès* (id., Halle, 1884). They are written in octosyllabic couplets, light, flowing, and full of charm. Consult Potvin, *Bibliographie de Chrestien de Troyes* (Brussels, 1863); and see FRENCH LITERATURE; ARTHUR; PERCEVAL.

CHRESTOM′ATHY (from Gk. χρηστομάθεια, *chrēstomatheia*, chrestomathy, from χρηστός, *chrēstos*, good + μανθάνειν, *manthanein*, to learn). A collection of extracts, or text-books, useful in learning a language or gaining special information.

CHRIEMHILD, or KRIEMHILD, krēm′hĭlt. See NIBELUNGENLIED.

CHRISM, krĭz'm (from AS. *chrisma*, OHG. *chrismo*, Ger. *Chrisam*, from OF. *chresme*, Fr. *crême*, It. *crisma*, Lat. *chrisma*, oil, from Gk. χρῖσμα, ointment, from χρίειν, *chriein*, to anoint). The name given to the oil consecrated on Maundy Thursday, in the Roman Catholic and Greek churches, by the bishop, and used in baptism, confirmation, orders, and extreme unction. There are two kinds of chrism used in the Roman Catholic Church—the one, a mixture of oil and balsam, is used in baptism, confirmation, and orders; the other, which is merely plain oil, is used in extreme unction. That in the Greek Church contains many ingredients.

CHRISOM, krĭz′om (variant spelling of *chrism*). The name of the white vesture laid by the priest on the child in former times at baptism, to signify its innocence. It was generally presented by the mother as an offering to the Church when she came to be 'churched'; but if the child died before the mother was 'churched,' it was used as a shroud. By a common abuse of words, chrisom came to be applied to the child itself if it died before it was baptized. A chrisom child is a child in a chrisom cloth.

CHRIST (Lat. *Christus*, Gk. Χριστός, *Christos*, anointed, from χρίειν, *chriein*, to anoint). The Greek term is found in the Septuagint, where it translates varied forms of the Hebrew verb *māshakh* (to anoint), most frequently the nominal form *māshīakh* (an anointed one), whence the English term *Messiah* is derived; and also in the New Testament. The Hebrew idea of anointing was at first comprehensive, being broadly applied, not only to priests (e.g. Lev. iv. 5) and to kings (e.g. I. Sam. ii. 10), but later to the prophets (e.g. I. Kings xix. 16) and to the patriarchs (e.g. Ps. cv. 15). It came, however, to be narrowed down to the king, as the religious head of the nation; and, as prophecy gave rise to the expectation of an ideal king, who was to be the redeemer and restorer of the Jewish nation, it was finally referred specifically to him (e.g. Ps. ii. 2). The first application of this idea in its full technical sense to this expected king is found in the apocryphal Book of Enoch (xlviii. 10).

In the New Testament, Christ is used both as an appellative and as a proper name. In both cases it occurs either with or without the article, either alone or in combination with other terms and names (e.g. Mark viii. 29; Luke xxiii. 2; Rom. xv. 3; I. Cor. iii. 11). Always when used as a proper name, and frequently where otherwise used, it is a designation of Jesus of Nazareth, as the expected Messiah of the Jews. It is from this application of the term that its English meaning is derived. See CHRISTOLOGY; CHRISTIANITY; JESUS CHRIST; and MESSIAH.

CHRIST, DESCENT OF, INTO HADES. See APOCRYPHA (paragraph *New Testament*).

CHRIST AMONG THE DOCTORS. A painting by Ingres. It hangs in the Musée Municipal, Montauban, France.

CHRIST BEARING THE CROSS. A famous statue by Michelangelo, in the Santa Maria sopra Minerva, Rome. It was ordered by Meteleo Vari and Paolo Castellari for that church in 1514, and was set in its present place, to the left of the altar, seven years later. It was completed by Pietro Urbano and Roderigo Frizzi, and represents its subject nude. A bronze drapery has been recently added, an act which speaks more for the modesty than the taste of its perpetrators.

CHRIST IN ART. The representations of Christ are the most important part of Christian iconography (q.v.). In the early period art did not try to embody God the Father or the Holy Ghost in any human form—the former was symbolized by a hand appearing out of a cloud, and then only seldom: the latter in the form of a dove. In all the acts of creation and in the Old Testament events embodying relations between God and man, it is always the Son who is represented by the artist. So far as art is concerned, the following categories are fairly comprehensive: (1) Portraiture of Christ; (2) Christ in the Old Testament; (3) Christ in the New Testament: His life on earth; (4) Christ after the resurrection; (5) ideal conceptions of Christ. In regard to Christ's appearance on earth, the controversy among early writers was extremely bitter; and, as Irenæus tells us, in the Second Century, that no reliable portraits existed, there was room for any theory. There were, broadly speaking, two schools. One, mainly the African Church, maintained that Christ was ugly, in order to proclaim the triumph of mind over matter, of internal over external beauty, and out of hatred for the Hellenic and pagan worship of the beautiful. The other, mainly the Greek fathers, refused to see in Christ anything but perfection. The Latin Church did not intervene forcibly on either side. These conceptions are reflected in art. In early Latin art, represented in the catacomb frescoes (Second to Fourth centuries) and sculptured sarcophagi (Third and Fourth), He is a youth, beardless, with long, curly hair —so young that by no possibility could it be supposed to be the portrait of a man of thirty. Artists evidently wished to avoid being accused of attempting any such thing. But before the close of the Fourth Century Saint Augustine speaks of the different types of portraits of Christ which artists were then attempting. Of these types one survived all others, and, with modifications, was handed down to the Renaissance. It was purely conventional, and only later writers sought to base it upon early tradition, such as the description in the spurious 'Letter of Lentulus,' and the acheiropoetic images, or miraculous portraits, like the handkerchief of Veronica. This type had an oblong, oval face, with broad, smooth forehead, straight, slender nose, arched brows, hair parted in the middle and falling in long ringlets over the shoulders, a full beard of moderate length, and an expression grave but sweet. This bearded, poetic, and intellectual type originated with Greek Christian art, and was brought by it to Italy. Some examples of it appear in the catacombs; imperfectly in the sarcophagi (a fine example in the Lateran Museum); better in the frescoes (at Saint Calixtus and Saint Pontianus); coarsely at Santa Costanza; more refined in the mosaics of Santa Pudentiana (c.400), Rome, and San Apollinare Nuovo (c.500-550), Ravenna. It is primarily intended to represent the Christ triumphant, transfigured, or in heaven, not the Christ of the earthly miracles. The beardless type became entirely obsolete before the close of the Fifth Century, and Christ was represented bearded and older, whether on earth or in heaven. This marks the close of the first period, from c.100 A.D. to 500, and during these centuries Christ had been portrayed mainly as follows:

During the Second Century almost the only way of presenting Him in the catacomb frescoes was as the Good Shepherd, either carrying a lamb on His shoulders or in the midst of the sheep; then, in the Third Century, came the first use of the scene of the Adoration of the Magi, and perhaps even earlier the Baptism, the Samaritan woman at the well, and the Resurrection of Lazarus—subjects used as symbols and not as episodes. The commonest method was to present Christ under symbols that only the faithful would recognize—as the Lamb, the Fish, the Vine, as Orpheus charming with his music. With the triumph of Christianity (312), a new stage opened, in which, on the one hand, the art of the catacombs is continued in the sculptured sarcophagi, and on the other the monumental art of the basilicas strikes a new note in representations of Christ. Such episodes of the life of Christ as would be suitable were carved on the sarcophagi; but as yet no complete historic series of these episodes were attempted. Christ triumphant was enthroned in the apses of the new churches; enthroned or seated on a globe or standing among the twelve apostles, teaching them and giving Paul and Peter authority to preach and govern. The scene is in the Heavenly Jerusalem, and from beneath His feet flow the four rivers of Paradise. The spiritualizing of the scenes continued up to the Fifth Century—

the mosaics of Santa Costanza (c.330), Santa Pudentiana (c.440), Santa Maria Maggiore (c.436), and Saint Paul (c.450), all in Rome, show how the visions of Saint John acquired more and more influence, until the culmination is reached in the twenty-four elders casting their crowns before a radiant bust of Christ in a medallion, with the four living creatures on either side. While this spiritual element was being developed, art was beginning to construct, also under Greek influence, a complete series of pictures of the life of Christ, in three main groups: (a) Infancy; (b) Miracles; (c) Passion: beginning with (1) the Annunciation; (2) Adoration of the Magi; (3) Massacre of the Innocents; (4) Presentation in the Temple; (5) Flight into Egypt, etc. The collection of sarcophagi in the Lateran Museum in Rome give the best series of subjects illustrating the miracles—the wooden doors of Santa Sabina (Fifth Century), and the mosaics of San Apollinare, Ravenna, the most detailed series of the Passion scenes, which were still without any element of suffering. Christ even here was the triumphant King. In the Santa Sabina reliefs is the first known portrayal of the Crucifixion. The San Apollinare series of c.500 admirably illustrate their transitional age. In the thirteen scenes from the Miracles, Christ is the beardless youth of the Christian sarcophagi (Fourth Century): in the thirteen scenes from the Passion, He has the later more majestic bearded type of the heavenly and triumphant Christ. The favorite scene in the apse of the basilicas is Christ on a throne or a globe, His head surrounded by a nimbus, holding a book in His left hand and blessing with His right, accompanied by angels and saints, who replace the apostles of the Fourth Century, except occasionally, though Peter and Paul are often retained. Sometimes—as at Saint John Lateran, Saint Paul, and San Venanzio—only a bust of Christ appears in the clouds. Until the Ninth Century the popularity of the Apocalypse and the scenes from the Heavenly Jerusalem caused the lamb to be retained as an emblem of Christ, even after a council of the Church had forbidden such pictures. The period from c.500 to 800, therefore, while it witnesses the creation of a positively individual type of Christ, and gives artists the liberty of portraying all the events of His life—even those of the Passion—lays but little stress on the humanity and the sufferings, much on the divinity and triumph, of Christ. The Carlovingian Age (800-1000) inaugurated the idea of the terror-striking Christ. The Apocalyptic scenes were partly replaced by realistic Last Judgments. The story of the painter-missionary Methodius terrifying the Bulgarians into conversion by such a painting is typical. At the beginning of the period it is not universally so—witness the beautiful mosaics of Santa Prassede in Rome. The type of Christ, also, still breathes majestic sweetness and calm. Byzantine art probably invented at this time some of its most beautiful types of Christ, handed down since by tradition—Christ winged as the Angel of the Divine Will, or as the High Priest. The illuminated manuscripts of this period, both Byzantine and Carlovingian, give the most varied material for study. A favorite new composition is Christ crowning the Emperor (or Empress) of the East or West. In the Eleventh and Twelfth centuries Christ becomes more and more the severe Judge, with whom the Virgin and John the Baptist act as intercessor, though He is still surrounded by the four cherubim evangelists, the twelve apostles, and sometimes the twenty-four elders. But He no longer appears seated on a globe or a throne with a few saints in the celestial sphere—He is almost always brought into immediate contact with human affairs. The frescoes of Ferentillo, San Tommaso in Formis, San Pietro in Grado, in Pisa, the mosaics of Torcello, and innumerable other works of the Eleventh and Twelfth centuries, show the increasing emphasis of the severe side of Christ's character, and the theological and dogmatic tendency. The growing asceticism of the type of Christ is shown also in Byzantine art, which, however, retains much beauty and serenity, which it does not lose until the Twelfth Century. The mosaics of San Marco in Venice, of the cathedral of Cefalù, of Monreale, and the Capella Palatina in Palermo, are among the most important series of scenes and types of Christ. The Byzantine conception, as expressed in the Greek *Guide to Painting*, edited and translated by Didron and Durand, should be read in the presence of such mediæval works, to show how traditional and carefully taught were all representations of the Saviour, as to type, age, garments, color, attitude, grouping with other figures, etc.

The devotional idealism and realism of the Thirteenth and Fourteenth centuries disputes the field with the power to recreate a spiritual type of Christ. In Italy the tendency was to give prominence to the sufferings of Christ. This is painfully evident in those Crucifixions of the Berlinghieri, of Margaritone, Cavallini, Giovanni Pisano, and other painters and sculptors. The emaciated and distorted body, the drawn face, the gaping wounds are intended to excite a sentimental piety. French Gothic art was more sedate. The Christ carved for the cathedrals was the Divine Teacher. The statue of the Beau Christ of Amiens is typical of a large class, to be met with in Chartres, Rheims, Paris and elsewhere. Comparing the art of the West, both in its works and in such literary treatises as that of Durand (*Rationale Divinorum Officiorum*), it is evident that the West is comparatively narrow in its range of representations, and that it lays increasing emphasis on the psychological, even the pathological side of Christ's life—a side very lightly touched upon in the East. At the same time representations of the three persons of the Trinity became common in the West for the first time, often strangely imagined. For the first time, also, the scene of the Virgin and Child is often repeated. Not that it was entirely unknown in earlier times, but its sudden popularity accords with the humanitarian and psychological period. We are now met with two important facts: first, the death of the Christian (Byzantine) art of the East, which removes the most original and spiritual element in representations of Christ; second, the revival of painting under Giotto and his successors. While painters continue, in their choice of subjects, to live on earlier traditions, they not only show the effects of the times by abandoning dogmatic representations of the Saviour for scenes of the Mother and Child and the Crucifixion, but they show it also by the attempt to give physical charm to the portraiture of Christ. While adhering in broad lines to the portrait referred to at the beginning of this article, each painter gave his own interpretation, and so we have interesting creations of such Italian artists as Gaddi, Orcagna, Masaccio, Fra Angelico, Leonardo, Raphael, and others. There is less and less of religious significance and idealism in these types until we reach such heads as those of Titian, Rubens, Domenichino, Carracci, and Rembrandt. With the departure of faith in the artist the representations lose historic value and are expressions of the individual taste of the artist rather than a reflection of the religious ideas of the age. Here, therefore, such a study as this ends.

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CHRIST, ORDER OF THE KNIGHTS OF, IN PORTUGAL. An order instituted in 1317, by King Diniz, of Portugal (1279-1325), and endowed with property confiscated from the Order of the Templars, which he suppressed in 1314. It was founded in imitation of the Spanish orders of Alcántara (q.v.) and Calatrava (q.v.), and the lives of the Cistercians. The new order was established "for the defense of the faith, the discomfiture of the Moors, and the extension of the Portuguese monarchy." With some difficulty, Pope John XXII. was induced, in 1319, to sanction the new order, but only on condition that the knights swore fealty to the Pope, and that their Grand Master made a special vow of such obedience before the abbot of the Cistercian monastery of Alcobaça, one of the largest and richest then extant, who was the Pope's special representative. The knights joined in all Portuguese crusades against the infidels, and also in their African and Indian expeditions, receiving in compensation continual additions to their own possessions. The Grand Prior of the order was invested by Pope Calixtus III. (1455-58) with power equal to that of a bishop; and, as an encouragement to adventure, the knights were promised all the countries which they might discover, to be held under the protection of Portugal. Under such favorable conditions, it is no wonder that the order became immensely rich. Its headquarters was the splendid castle of Thomar, 70 miles northeast of Lisbon, whence it had been in 1334 transferred from the castle of Castro Marino, at the mouth of the Guadiana. At length their wealth and power excited the jealousy of the kings of Portugal; their future acquisitions, and subsequently even their actual possessions, were declared to be Crown possessions, and the offices of Administrator and Grand Master were transferred to the Crown. Noble descent, and three years' military service against the infidel, were required for admission. The members took the three monastic vows of celibacy, poverty, and obedience, till Pope Alexander VI. (1492-1503) released them from the first two, on condition of their applying the third part of their revenues to the support of the Thomar cloister, the priests of which were bound by the three vows. In 1523 King John III. turned the order into a monastic one. In 1797 it was secularized, and it is now merely an honorary order. Its membership, which is restricted to Catholics of noble descent, is very large.

The order was nationalized in Brazil in 1823, but was dissolved in 1890.

CHRIST, PAPAL ORDER OF. A branch of the Portuguese order created by Pope John XXII. (1316-34) for Italians. It has only one class, and is now merely honorary.

CHRIST, PERSON OF. See CHRISTOLOGY.

CHRIST, or CRISS-CROSS, ROW. The alphabet arranged in the form of a cross, as the symbols of Christ's crucifixion, for the use of children, and so printed in old hornbooks, or primers. The letter A was at the top and Z at the foot of the cross. See HORNBOOK.

CHRIST, krĭst, WILHELM VON (1831—). A German classical philologist, born at Geisenheim, August 2, 1831. He has been professor in the University of Munich since 1860, and is the author and editor of numerous works, of which the most important are: *Die metrische Ueberlieferung der pindarischen Oden* (1868); *Metrik der Griechen und Römer* (1879); *Attikusausgabe des Demosthenes* (1882); *Griechische Litteraturgeschichte* (1898).

CHRISTABEL, krĭs′tȧ-bĕl. (1) An old ballad which deals with the love of a princess, the title character, for the valiant Sir Cauline. The latter is killed in rescuing her from an Eastern potentate, and she thereupon dies of grief. (2) A poetical fragment by Coleridge (1816), a bit of haunting melody and genuine inspiration. Before its publication, Scott heard lines of it recited, and adopted the metre for his "Lay of the Last Minstrel" (1805). Saintsbury finds in it a metrical resemblance to Gottfried von Strassburg's *Tristan* and Spenser's "The Oak and the Brere." Admirably adapted as is the vehicle, the story is itself of engrossing interest, and is narrated with the poet's best art. A parody appeared in *Blackwood's*, June, 1819.

CHRIS′TADEL′PHIANS (from Gk. *Χριστάδελφος*, *Christadelphos*, having brotherhood with Christ, from *Χριστός*, *Christos*, Christ + *ἀδελφός*, *adelphos*, brother), or BROTHERS OF CHRIST. A religious sect in the United States, Canada, and Great Britain, organized by John Thomas, M. D., an Englishman, who came hither in 1844 and at first belonged to the Disciples. But being "convinced by a study of the Bible that the cardinal doctrines of the existing churches correspond with those of the apostate Church predicted in Scripture," he spread his views. Making converts, he formed them into societies, which, till the outbreak of the Civil War, had no distinctive name, but the one now held was selected when their members claimed exemption from military duty on the ground of conscientious opposition to war. The principles of the sect are thus stated: The Old and New Testaments are equally important: God will restore to immortal life all who love him in this life, but those who have not accepted this immortal principle cease to exist at death; there is no personal devil; Christ is the son of God, deriving from the Deity moral perfection, but from His mother a human nature;

He has the threefold character of prophet, priest, and king: the first office He fulfilled by His life and death on earth, and now as priest He mediates before the Deity: as king He will return to earth and reign over all the world from the throne of David in the Holy Land. In 1895 the Christadelphians had in the United States 63 organizations and some 1300 members. They reject the doctrine of the Trinity, practice immersion, and have no ordained ministry. Consult H. K. Carroll, *The Religious Forces of the United States* (New York, 1896), pp. 89-90, 454.

CHRIST À LA PAILLE, krėst à lȧ pȧ'y' (Fr., Christ of the straw). A painting by Rubens, made about 1617, representing the body of Christ lying on a stone bench and covered with straw. The lifeless form is supported by Joseph of Arimathæa, and the Virgin, the Magdalen, and John weep beside it. The canvas now hangs in the large central room of the museum in Antwerp, Belgium. It was designed as an altar-piece, and is flanked by pictures of the Virgin and Child and the Evangelist Saint John.

CHRISTCHURCH. A Parliamentary and municipal borough and seaport on the English Channel, in Hampshire, England, at the head of the estuary formed by the Avon and Stour, 24 miles southwest of Southampton (Map: England, E 6). The priory church, partly of Norman and partly of early English architecture, one of the most interesting and beautiful of English ecclesiastical structures, dates from the reign of William Rufus, and was restored in 1861. The Parliamentary borough comprises two favorite watering-places, Muddiford and Bournemouth, and returns one member to Parliament. Christchurch Bay has a double tide every twelve hours. Christchurch was known in Saxon times as Tweonæteam, but took its present name from the Augustinian Abbey of Christchurch, founded here before the Conquest. Population, in 1891, 4000; in 1901, 4200. The church contains a monument to Shelley.

CHRISTCHURCH. The capital of the Province of Canterbury, South Island, New Zealand, situated on the river Avon, about eight miles from the sea (Map: New Zealand, D 5). Its port is Lyttelton, with which it is connected by a railway. It is the centre of a great grazing district, and also has flourishing manufactures, of which boot and shoe making is the chief. There is a large export trade, mainly in timber and wool. The city possesses numerous fine public buildings, churches, including a fine reproduction of Caen Cathedral, France, a museum, a theatre, Christ College, high schools, parks, and pleasure grounds. The city has steam tramways, and owns an abundant artesian well-water supply. The United States is represented by a consular agent. Christchurch is the see of the New Zealand Bishopric of Canterbury. The city owes its foundation to the Canterbury Association, incorporated by royal charter in 1849, a society of influential men which included the Archbishop of Canterbury, Lord Lyttelton, and other prelates and peers. Each of its streets, laid out on a rectangular plan, bears the name of an English diocese. Population in 1891, 16,200; with suburbs, 31,600; in 1901, 17,537.

CHRIST CHURCH. A college at Oxford, England, the magnificent project of Cardinal Wolsey, when, as the minister of Henry VIII., he was the most powerful man in England next to the King. The foundation was to be known as Cardinal College and was to have in connection with it a school in Ipswich, Wolsey's native place. The plans for the college were drawn, and the building begun in 1525, but with the fall of the Cardinal in 1529, and his death in 1530, the whole project fell to the ground. In 1532, however, Henry VIII. took up the work, refounded the college on a smaller scale under the name of King Henry the Eighth's College, and in 1545-46 he again reconstituted it under the name it now bears, and united it with his newly established see of Oxford by the removal of the episcopal establishment from Osney to Christ Church. He thus formed a unique union of cathedral and college, from which the foundation was called *Ædes Christi*, or the House of Christ. It is spoken of generally as the 'house,' not the college, and the incumbents are referred to as the Dean and Chapter, not of Oxford, but of Christ Church. The original foundation was for a dean, eight canons, eight clerks, a schoolmaster, one hundred students, choristers, and an organist. In accordance with the few changes of 1882, there were a dean, six canons, thirty-one senior students (i.e. fellows), two lecturers, a number of honorary students, sixty scholars, and twenty-nine exhibitioners, besides six chaplains, an organist, singing men, and choristers, the whole forming the largest collegiate establishment in Oxford. The buildings about the great quadrangle (Tom Quad) include the cathedral, which occupies the site, and contains some of the work, of the Saxon nunnery of Saint Frideswide, and the Hall, with the exception of the Hall of William Rufus at Westminster, the most splendid example of its kind in England. Christ Church is one of the foremost colleges in Oxford, and has always been famous for its distinguished members. Among these may be mentioned five prime ministers of England in the Nineteenth Century—Canning, Peel, Gladstone, Salisbury, and Rosebery. Of the other political worthies may be noted Arlington, Nottingham, Godolphin, Bolingbroke, Carteret, Wyndham, Grenville, Sir G. C. Lewis, Lord Elgin, and Lord Dalhousie. Christ Church has had on its books, besides these, such names as Lyttelton, Mansfield, John Locke, William Penn, Ben Jonson, Camden, Sir Philip Sidney, John and Charles Wesley, Dr. Pusey, and Ruskin.

CHRISTEN, krē'sten, ADA. See BREDEN, CHRISTIANE.

CHRISTENING, krĭs'en-ĭng (from AS. *cristenian*, to Christianize, baptize, from *cristena*, Christian, from Lat. *Christianus*, Gk. Χριστιανός, *Christianos*, Christian, from Χριστός, *Christos*, Christ). A term often used as equivalent to baptism (q.v.). It is disliked by some, and of course liked by others, as favoring the doctrine of baptismal regeneration; being, indeed, according to its derivation, expressive of the notion that a person is made a Christian in baptism. But, like many other terms, it is frequently employed without reference to its origin, and without any intention of conveying the opinion which it might be strictly held to imply.

CHRISTENING A SHIP. The present custom of christening ships doubtless grew out of the ancient libations practiced when ships were launched. The action of blessing ships is alluded to by the monks of Saint Denys. In July, 1418, the Bishop of Bangor was sent to South Hampton to bless the King's ship, the *Grâce à Dieu*, and received £5 for his expenses. The christening is ordinarily performed by a lady, who breaks a bottle of wine against the stem as the ship starts down the ways in launching, and at the same time utters the christening words. In the Russian Navy the christening ceremony is performed by a priest, and takes place at some convenient time subsequent to the laying of the keel. At the conclusion of it, a silver plate bearing the name of the ship, date of christening, etc., is affixed to the keel.

CHRISTIAN. The name of the hero of Bunyan's *Pilgrim's Progress*.

CHRISTIAN II. (1481-1559). King of Denmark and Norway from 1513 to 1523, and of Sweden from 1520 to 1523. He was born at Nyborg, on the island of Fünen, July 2, 1481. As Crown Prince he distinguished himself in 1502 by the implacable cruelty with which he suppressed a Norwegian insurrection. As King he favored merchants, artisans, and peasantry, and deprived the nobility of many of their exclusive privileges. In 1520 he succeeded by force of arms in recovering Sweden for the Danish Crown, and marked his success by the execution in Stockholm of ninety-four men of high rank, and followed this up with sweeping executions throughout the country. His severity hastened the approach of the successful revolt of Sweden under Gustavus Vasa, which seated the latter on the Swedish throne in 1523. On his return to Copenhagen, Christian found the clergy and nobles of Jutland also in open rebellion, and in April, 1523, he fled to the Netherlands with his wife and children, calling upon the Emperor Charles V., his wife's brother, for assistance. Frederick of Holstein, uncle of Christian, took possession of the kingdom, supported by the clergy and nobles, but stoutly resisted by the burghers and peasantry. Aided by the Dutch, Christian made a final attempt to recover his throne, landing in Norway in 1530, but was defeated and made a prisoner in 1531, and remained until his death, January 25, 1559, a captive in the Castle of Sonderborg, on the island of Alsen. See Denmark: Norway: Sweden.

CHRISTIAN IV. (1577-1648). King of Denmark and Norway from 1588 to 1648. He was born April 12, 1577, in Fredericksborg, Zealand. In 1611-13 he carried on a war against the young Gustavus Adolphus of Sweden, and yielded some territory. In the second period of the Thirty Years' War (1625-29) an exaggerated military reputation and England's support made him the leader of the Protestants, but only disaster resulted. His forces were overwhelmed by Tilly at Lutter in 1626. He was driven back into Jutland, which was overrun by the enemy, and in 1629 made peace with the Emperor Ferdinand II. at Lübeck. Soon after his Swedish rival became the Protestant leader. He waged war with Sweden unsuccessfully from 1643 to 1645. In civil affairs, however, he proved himself a capable sovereign, introducing financial and legislative reforms, encouraging industry and science, and giving a powerful impetus to both the external and the internal trade of his kingdoms. The present capital of Norway was founded by him and bears his name. See Denmark.

CHRISTIAN VII. (1749-1808). King of Denmark and Norway from 1766 to 1808. He succeeded his father, Frederick V., in 1766. He was miserably feeble and incapable, and scarcely exercised any influence in the government. The actual power was wielded successively by his ministers, Bernstorff and Struensee, and his son Frederick, who became joint regent with his mother, Caroline Matilda, sister of George III. of England, in 1784, and upon the death of Christian assumed the title of King Frederick VI. (q.v.). Christian died March 13, 1808.

CHRISTIAN VIII. (1786-1848). King of Denmark from 1839 to 1848. He was a nephew of Christian VII., and was born September 18, 1786. When Norway was ceded to Sweden by the Treaty of Kiel, the people of the former country repudiated the act of alienation, and Prince Christian was made Governor. He raised an army and convened a diet, at which a constitution was framed, and he was elected, May 29, 1814, King of Norway under the title of Christian I., but the Norwegians were unable to withstand the invading Swedish army under Bernadotte, and the Allied Powers compelled Christian formally to relinquish the throne on October 10. He succeeded Frederick VI. as King of Denmark in 1839. His reign was characterized by industrial progress and by increased political liberty.

CHRISTIAN IX. (1818—). King of Denmark since 1863. He was born April 8, 1818, the fourth son of Duke William of Schleswig-Holstein-Sonderburg-Glücksburg. As the male line of the House of Oldenburg, which had occupied the Danish throne since 1448, was approaching extinction in th person of Frederick VII., the great Powers, by the Treaty of London, May 8, 1852, to maintain the integrity of the Danish monarchy, "as connected with the general interests of the balance of power in Europe," guaranteed the succession to Prince Christian, by right of his wife, who was a niece of King Christian VIII. The London agreement was ratified by the Danish Diet, by the Act of Succession of July 31, 1853. Accordingly Christian became King on the death of Frederick, November 15, 1863. Soon after his accession the trouble over the duchies (see Schleswig-Holstein) reached an acute stage, and Denmark was compelled to relinquish them in 1864, after a brief war with Austria and Prussia. From 1873 to 1894 the King was engaged in a constitutional conflict with the democratic parties over the question of the responsibility of the Ministry. The conservatives finally triumphed. In 1874, on the occasion of the millenary of Iceland, he granted the island a new constitution, and visited it in person. Christian married, May 26, 1842, Louise, daughter of Elector William of Hesse-Cassel. They had five children. Of these, Alexandra is Queen of England, Dagmar is Empress Dowager of Russia, and George is King of Greece. Queen Louise died September 29, 1898.

CHRISTIAN of Brunswick (Braunschweig-Wolfenbüttel) (1599-1626). A German prelate and soldier, Lutheran Bishop of Halberstadt, and a prominent commander in the Thirty Years' War, styled 'the Madman of Halberstadt.' He was born in Groningen (Saxony), and became

Bishop of Halberstadt in 1616. His military training he obtained in service in the Netherlands, under Maurice, Prince of Orange, against the Spanish. After Frederick V., Elector Palatine (q.v.), had lost Bohemia and the Palatinate through the disastrous battle of White Hill, Christian offered his sword in defense of the Electoral cause, and in 1621, with an army of 15,000, plundered Roman Catholic churches and religious establishments along the river Main and through Westphalia. He was defeated by General Tilly at Höchst, and was dismissed by the Elector. Subsequently, as a commander under Prince Maurice, he defeated the Spaniards at Fleurus (in the modern Province of Hainaut, Belgium). Afterwards he returned to Lower Saxony, and was signally defeated by Tilly at Stadtlohn (August 6, 1623). With English and French assistance he and Count Mansfield took the field in 1625, in command of an army of 14,000, under the general direction of King Christian IV. of Denmark, the Protestant leader. He died, however, before anything was accomplished. See THIRTY YEARS' WAR.

CHRIS'TIAN'A. The wife of Christian in Bunyan's *Pilgrim's Progress.* She is left in the City of Destruction (q.v.) by her husband. In the second part of the allegory she also leaves that place, and her subsequent adventures form the chief interest of the plot.

CHRISTIAN ART (EARLY). While it is easy to show when and how Christian art began, it is not easy to say when it ended—if it has ended. In the nomenclature of art history, however, the term early Christian art is generally accepted as describing the monuments produced under the influence of the Christian religion before the year 800, when Charles the Great was crowned Emperor of the West, an event which may be said to have inaugurated a new period in the history of the Middle Ages. It is, therefore, Christian art before its mediæval form was developed, while it still retains much of antique tradition. It falls into three divisions: (1) Pre-Constantinian (c.100-312); (2) from Constantine to Justinian (c.312-550); (3) Justinian to Charlemagne. The first period is mainly illustrated by the Roman catacombs, and shows Christian art in embryo; the second can be studied principally in the great basilicas and other churches of Italy, though the few examples at all well preserved in the East show that art was there quite as advanced; the third is illustrated in both East and West, but the decadence which is so evident, so finally fatal to artistic life in the West, is far less apparent in the East, whose monuments are more numerous and magnificent.

ARCHITECTURE. There was very little opportunity for anything characteristic in the architecture of the early Christians. Constantine in 313 gave Christians freedom to erect places of worship. All that remains of early Christian art before this date is described in the article on CATACOMBS. The style formed in the Fourth Century is called basilical, because this name was given to the large churches that were by far the most important monuments erected. Christian architects faced the problem of creating a large interior for worshiping multitudes, in contrast with ancient worship, which was in the open air. In pagan temples nearly all the artistic efforts had been concentrated on the exteriors. Christian art neglected the exterior, leaving it of bare brick, conditioned in its form entirely by the interior arrangement and proportions. The arrangements of these churches are elsewhere described. (See BASILICA; APSE; TRANSEPT; ATRIUM; NAVE; AISLE; ALTAR; CHOIR; CONFESSION.) Structurally they were of little importance. No rivalry with the great domed and vaulted halls of the Roman imperial baths was attempted. The interiors were roofed, and the thin brick walls had simple doors and windows. The general composition was good—columnar vestibule to a high, encircling wall; square open court or atrium; open porch with three doors leading into an oblong interior divided into three or five aisles by rows of columns, supporting either a straight architrave or a line of arches. The dominant note of the interiors was not form, light, and shade, but color, given by mosaic paintings (see MOSAICS) or frescoes (see FRESCO) on the walls and rich hangings between the columns. (See HANGINGS.) This is what might be termed the official style, prevalent throughout Italy and in Greek lands, but elsewhere other ideals prevailed. The following schools may be distinguished: (1) *Roman*—in Rome, Milan, and most Italian cities; in southern Gaul; and in Rhenish Germany. (2) *Græco-Roman*—with decided Hellenic and Oriental influences, in several cities of Italy, where this element was strong, as in Ravenna and Naples; in the Adriatic provinces of Istria and Dalmatia; and in Greece proper and the Balkan Peninsula. (3) *Asia Minor;* with use of stone and of vaulting, with heavier proportions and differences in plan. (4) *Syria,* especially in the ruined cities of the Hauran, and regions of Antioch and Damascus, where stone styles of great originality were developed. (5) *Egypt,* where the Christian Copts drew both from ancient Egyptian and from Hellenic Christian models. (6) *Northern Africa,* especially the present Algeria and Tunis, where the French excavations have brought to light a large number of early churches, but all in ruins. In these schools the earliest works were nearly always the finest, because in the Fourth Century the Roman Empire was still comparatively flourishing, and Imperial funds were lavishly used in building and decorating churches. The Church itself was far richer than during the barbarian inroads. The early Christian style lasted much longer in the West than in the East or in Greece, because the decay in the West caused by the barbarian invasions prevented the developments and changes that were possible in the East, where civilization continued uninterruptedly at a high level. In Italy, Gaul, Spain, and Germany it ruled far into the Middle Ages, the basilical type of church prevailing in many parts until the Twelfth Century. But in the Orient, where it never had so uniform a type, it gradually gave way to what is termed the Byzantine style. In Salonica (Thessalonica), which came next to Constantinople as a Greek centre, the wooden-ceiled churches continued to be built side by side with the domical ones until the Eighth and Ninth centuries. But elsewhere, as early as the Seventh Century, the flimsier wooden-roofed style had been entirely superseded by the Byzantine vaulted structures. The following are some of the basilicas which remain wholly or in part:

In Rome—Santa Maria Maggiore (Fifth Century), San Paolo fuore li Muri (Fifth), Santa Sabina (Fifth), San Pietro in Vincoli (Fifth), San Lorenzo (Sixth, old part), Sant' Agnese (Seventh), Santa Maria in Cosmedia (Eighth), Santa Prassede (Ninth), San Martino di Monti (Ninth). In Ravenna—San Teodoro (Fifth), San Francesco (Fifth), San Apollinare Nuovo (Sixth), San Apollinare in Classe. In Spoleto—San Agostino. In Perugia—San Pietro. Also on the Adriatic basilicas in Parenzo, Pola, Grado, all of the Sixth Century. In Constantinople—Saint John (Fifth). In Bethlehem—Church of the Nativity. In Salonica—Saint Demetrius. In Syria, such a multitude of churches, from the Basilica of Shagga, in the Fourth Century, to the Church of Saint Simeon, in Kalat Siman, in the Sixth Century, that enumeration would be impossible. In nearly all these buildings, and in many others of less importance or poorer preservation, the one official type (see BASILICA) is followed. The differences are mainly in the common use by Greek and Eastern churches of the gallery for women over the side aisles, of double capitals over the columns, of polygonal apses, and of a modification of the old Corinthian and Ionic orders that led up to Byzantine ornament. In fact, from the beginning, architecture in the East was tending toward the Byzantine. If one were to select a half-dozen out of all the remaining early basilicas as the finest and best-preserved examples of the style, these would be: Church of the Nativity, Bethlehem; Santa Maria Maggiore, Santa Sabina, and Santa Prassede, Rome; the two San Apollinares in Ravenna; and the cathedral in Parenzo. They have preserved a great part of their original decoration, as well as their architecture. There was another important class of early Christian buildings, the baptisteries, chapels, sacristies, mausoleums, and other religious structures, that were built not on an oblong, but on a concentric plan—that is, buildings that were circular, polygonal, or even equilaterally cruciform. These buildings are of course comparable to Roman structures like the Pantheon, the Temple of Vesta or Minerva Medica, or the vaulted halls in the baths; but they were never so bold or on so large a scale. At first even churches were sometimes built in this form (Antioch; San Stefano Rotondo, Rome; Saint George, Salonica): but this was found impracticable for liturgical reasons, and it was thenceforth confined to other religious and funerary structures. Some were square externally and octagonal internally, by means of niches, like the two baptisteries in Ravenna and that in Kalat Siman; some purely circular, like Saint George in Salonica. In these cases the dome rests upon the outer wall, but in the more developed and monumental examples it rests upon a row of columns, and is surrounded by a concentric aisle imitated from the straight aisles of the basilica, and covered by a lower roof. Sometimes both dome and aisles are of masonry, as in Santa Costanza in Rome and Santa Maria Maggiore in Nocera—both of them of circular plan; at other times, with lighter walls and higher proportions, the coverings are of wood, as in the Lateran baptistery in Rome, which is octagonal, and San Stefano Rotondo, which is circular and with two aisles. The type with dome and vaults of stone, brick, or tile in the hands of Eastern architects connects in the Sixth Century with the early stages of the Byzantine style, especially where the dome is placed on a square plan, and thus, and by means of an apse added at one end, a form is produced easily used as a church. This is the case with the Cathedral of Bozra and Saint George in Ezra in Syria, and with Saints Sergius and Bacchus in Constantinople. Some of the buildings have galleries over the aisles.

For civil buildings of this period, we must go to the Syrian cities, where there remain thousands of houses, halls, colonnades, sepulchral monuments, all well built in stonework, and telling us as much of contemporary life as Pompeii does for the previous centuries.

In so far as *materials* of construction are concerned, bricks were the common material in the West, including the Greek provinces, and this precluded sculptured decoration, because no marble facing was used. But in the Orient, especially in Syria, local stone replaced brick, and there is a great deal of good sculptural detail. Here also the normal types of the classic orders, slavishly followed further west, are varied by many new forms, which are not only connected with Persian and Byzantine ornament, but seem to foreshadow Romanesque and Gothic foliage and ornament. It is in Syria also that the greatest variety and inventiveness of architectural plan, composition, and form are shown. The masterpiece of the school is the monastery of Saint Simeon in Kalat-Siman.

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SCULPTURE. The earliest of the arts to fall, at the decline of the Roman Empire, was sculpture. The carvings on the Arch of Constantine, the Column of Theodosius, and the Imperial portraits of the Fourth Century, show this to have been so, even in the case of the most pretentious monuments. A few works of Christian sculpture of pre-Constantinian date come before this complete decadence. Such are the statue of Saint Hippolytus and that of the Good Shepherd in the Lateran Museum, and a few of the sarcophagi (q.v.). The latter form the bulk of early Christian marble sculpture during the Third, Fourth, and Fifth centuries, after which there was very little sculpture on a large scale of any sort. These sarcophagi, after the fashion of the earlier ones of the Etruscans and pagan Romans, had a line of reliefs covering face and sides. Sometimes, even, there were two superposed rows of figures. Many subjects were usually crowded together, though sometimes such scenes as the crossing of the Red Sea, or Jonah swallowed by the whale, occupy the entire front. The scenes are selected with evident relation to funerary ideas and belief in future life, and are thus very instructive. (See ICONOGRAPHY.) Most of them occur also in the catacomb frescoes. The technique begins to decline in the Fourth Century, as is shown by the liberal use of the trepan, the loss of finish, and of good proportions. The museum of the Lateran contains the largest collection, but there are many in Arles. In fact, throughout the Roman world a similar style prevailed. The sarcophagi in Ravenna show the stiffness and limitations of the latest sarcophagi—those of the Fifth and Sixth centuries. To this time probably belongs the last colossal statue of antiquity—the bronze emperor found at Barletta, hard in its style, showing the loss of ability since the time of the famous bronze statue of Saint Peter in the Vatican (Fifth Century). After the Sixth Century no attempt was made at monumental sculpture, the religious scruples of the Iconoclasts hastening the total downfall, which was complete both for the East and the West. The eclipse was to last about six centuries.

Painting and Mosaics. The painted ornamentation of the earliest crypts in the Roman catacombs, such as those of Domitilla and Priscilla, show that not until the middle of the Second Century was there enough that was significantly Christian to be called Christian painting. The technique is exactly the same as in contemporary pagan monuments; but a system of symbolism to express Christian faith is in process of formation. (See Iconography; a more general description is given under Catacombs.) Everything that could be regarded as a symbol of the resurrection and of salvation was represented, whether in the form of animate and inanimate symbols, such as the phœnix, the fish, or the bread; or of symbolic scenes, such as Noah, Daniel, or the three children in the furnace. In its limitation and simplicity this art was very direct, and appealed alike to learned and unlearned. After the time of Constantine, the historic, descriptive, genre, and dogmatic elements were added to diversify the art, while the deterioration of technique detracted from its appeal. The catacombs continue throughout the Fourth Century to furnish practically the entire material for study, because the churches of this period still in existence have partly or entirely lost their paintings. The art of mosaic painting now entered the field of figured composition, and rapidly displaced fresco painting in the larger and richer churches. The mausoleum of Constantia and the Church of Santa Pudentiana in Rome preserve works of this century of very different character—the former, in its semi-pagan decoration, harking back to the early catacombs, while the latter, with its ordered scene of Christ enthroned teaching the apostles and establishing the Church of the Jews and of the Gentiles, shows the new dogmatic and didactic tendency. While painting had been rather sentimental and free, it became now more systematically a religious handmaid. (See Iconography.) The desire to tell the people all the main facts of religious history led to the invention of a series of chronological illustrations of the events of the Old and New Testaments which, originating as early as the Fifth Century, were handed down, almost unchanged, for about a thousand years. The mosaics of Santa Maria Maggiore in Rome, with their scenes from Genesis (c.430), show the early phase of the style before its historic exuberance had been pruned to the selection of fewer types. The historic series soon became subordinate to the dogmatic, as in the later mosaics (c.500) in San Apollinare Nuovo, in Ravenna, portraying the life of Christ. This was due to the influence of the East and of Greece. Although nearly all the preserved works of painting and mosaic earlier than A.D. 800 are found in the West, there are abundant proofs that the change from the symbolic to the dogmatico-historic style was due to the Orient. One of these proofs is the series of Greek illuminated manuscripts of the Fifth and Sixth centuries, in which this style is fully developed, and which may have served as models to the Western painter—such were the Vienna and Colton Genesis, Rossano Gospels, etc. The Oriental love of color also dictated the replacing of the thinner, colder fresco by the richer, warmer mosaics. The two typical Italian schools are Rome and Ravenna, the former representing the Latin, the latter the Oriental-Hellenic current. In Rome the mosaics of Santa Sabina (Fifth Century) and San Cosmas and Damian (c.530) are the finest of their class—genuinely Roman; but the invasion of Byzantine methods is shown a little later in San Teodoro, and even more in San Venanzio. The Ravenna series is richer in the Fifth and Sixth centuries, with its two churches of San Apollinare, San Vitale, the two baptisteries, the archiepiscopal palace, and the tomb of Galla Placidia, filled with mosaics by the best artists of the Greek school. The use of the gold ground, which they made popular, revolutionized mosaic painting and made its figures as clean-cut as those of a Greek frieze. The period closes with the supremacy of the East in painting.

Minor Arts. The smaller branches of art appeared to feel the decadence the least. This was especially true of ivory-carving (q.v.) and metal sculpture. One branch, that of illuminated manuscripts (q.v.), may even be said to have been created at this time. The subjects portrayed were the same as in the larger arts. Certain branches were especially popular in special localities. Figured woven stuffs were worn in the Orient, especially in Egypt, Saint Asterius commenting on the personages who carried all the Old and New Testaments on their garments. Many such textiles have been found in the Fayum. Then there was the special industry of figures delicately outlined in gold on glass, as in so many cups found in the Roman catacombs. The earthenware and bronze lamps also were decorated with religious scenes. But the choicest remaining examples are the ivories and illuminations. The scenes carved on the diptychs were necessarily limited in character to the figures and functions of the consuls; but a greater variety appears in the boxes (pyxes), the book-covers, and other objects of ecclesiastical use, carved with great skill throughout this period, but especially between the Fourth and the close of the Sixth Century, which is also the Golden Age for illuminations.

Symbolism and Iconography. All early Christian figured art expressed or taught some religious truth, and was not produced primarily for æsthetic reasons. Therefore, the study of its subjects is even more interesting than that of its style. This will be treated under the title Iconography, as well as under Symbolism; Allegory; etc.

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CHRISTIAN BROTHERS COLLEGE. A Roman Catholic educational institution, situated in Saint Louis, Mo., conducted by the Brothers of the Christian Schools (q.v.). The college was chartered in 1855, and maintains collegiate, scientific, commercial, and preparatory departments. The value of the college buildings and grounds is about $650,000, and the total annual income is $30,000. The library contains, approximately, 20,000 volumes. The student enrollment in all departments is about 450.

CHRISTIAN CATHOLIC CHURCH. A religious denomination organized in 1896 by the Rev. John Alexander Dowie, a former minister in Australia. He came to the Pacific Coast of the United States, and then to Chicago, Ill., preaching and practicing faith-healing, and soon attracted a large following. While the generally received principles of the Christian religion are taught and the sacraments are observed in the Christian Catholic Church, special prominence is given to the doctrine of the divine cure of disease in answer to prayer, or faith-healing. A united consecration service at the close of the proceedings is a usual feature of their meetings. Baptism is administered to believers by trine immersion. The organization of the Church comprises the general overseer, its chief head (now Mr. Dowie), overseers for the larger districts, and seventies. Its work is carried on in the three lines, religious, educational, and commercial. The chief centre of the denominational organization is at Zion City, near Chicago, where large properties have been acquired and where its institutions and business enterprises are situated. Junior schools have been established. The highest school is Zion College. The cornerstone of a wing of an educational building was laid January 6, 1902. An assembly hall is contemplated. Among the business enterprises at Zion City are: The Zion Printing and Publishing House, Zion City Bank, Zion general store, and industries, of which the lace industry is planned on a very large scale. Besides the United States and Canada, the Christian Catholic Church is represented in England, Scotland, Ireland, Australia, New Zealand, China, Japan, and the South African states. From the first baptism, March 14, 1897, till the end of 1901, 11,847 baptisms had been reported, of which 7239 were in Chicago. In 1898 the denominations reported three tabernacles, one hundred halls and mission schools, and four divine-healing houses. The organs of the denomination are: *Leaves of Healing*, weekly (Chicago); *Little White Dove*, weekly (Chicago). Consult: J. A. Dowie, *A Voice from Zion*, four volumes of addresses (Chicago); *Zion's Conflict with Methodist Apostasy* (Chicago, 1901), a treatise against Free Masonry.

CHRISTIAN CHURCH, South. See Christians.

CHRISTIAN CICERO, sĭs'ē-rō (translation of Lat. *Cicero Christianus*). A name given to Lactantius, a Christian apologist of the Fourth Century.

CHRISTIAN CONVENTION. See Christians.

CHRISTIAN ENDEAVOR, Young People's Society of. A society originated by the Rev. Francis E. Clark, pastor of a Congregational church in Portland, Maine. Its first membership consisted of thirty-five boys and girls, who met, February 2, 1881, in the pastor's parlor, and pledged themselves to attend and take some part in a weekly prayer-meeting, and once a month to hold a consecration meeting. Other duties, social, religious, literary, and of various kinds, were assigned to different members. The idea met with instant acceptance. It offered young people in the Church something to do and to employ their energies. At present organizations similar to the first one are found the world over in churches of various denominations; the joint membership is about 3,500,000, and the annual conventions are attended by enormous crowds. These scattered organizations are bound together by a corporation, the United Society of Christian Endeavor, organized 1885, with headquarters in Boston and managed by a board of trustees. The organ of the society is *The Christian Endeavor World*. In 1895 the World's Christian Endeavor Union was formed. For details, consult L. W. Bacon and C. A. Northrup, *Young People's Societies* (New York, 1900).

CHRISTIAN ERA. See Chronology.

CHRISTIAN HERO, The. A moral treatise by Richard Steele (q.v.), published, with a dedication to Lord Cutts, by Tonson, in London, in April, 1701. A second and elaborate edition appeared in July of the same year. It purports to be "an argument proving that no principles but those of religion are sufficient to make a great man."

CHRISTIANIA, krēs'tē-ä'nē-ȧ, or **KRISTIANIA.** The capital of Norway, situated at the northern end of Christiania Fiord, in latitude 59° 55′ N. and longitude 10° 43′ E. (Map: Norway, D 7). It occupies about seven square miles. Christiania is composed of the old, well-built city proper, and of a number of rather uninviting suburbs where the poorer classes live. There are broad streets, and fine, large squares adorned with monuments. The promenade of Saint John's Hill is one of the city's attractive features. The historic citadel of Akershus now serves as an arsenal and prison. The most noteworthy churches are the Gamle Akers Kirke, mentioned before 1150; the Trinity Church, erected in the Gothic style in 1853-58; the Church of Our Saviour, consecrated in 1697 and recently restored; and the Johannes Kirke, completed in 1878. The more prominent secular buildings are the Parliament House, the Museum of Art, the exchange, the royal palace, constructed in 1825-48, the episcopal residence, and the University. (See Christiania, University of.) The botanical garden and astronomical observatory are worthy of mention.

Christiania forms a separate official district, and is administered by a magistracy composed of the burgomaster and two councilmen. It has good water-works and several electric car lines. The educational institutions comprise, besides the university, two higher military schools, a gymnasium, a technical school, and a number of Latin and 'real' schools. The Museum of Art contains many meritorious paintings by Scandinavian and foreign artists, but no great masterpieces. The Industrial Art Museum has fine ancient and modern specimens of Norwegian handicraft. There are three theatres, and a municipal library of about 50,000 volumes.

Industrially Christiania is quite important. Among its leading manufactured products are paper, oil, cotton yarn, tobacco, furniture, ironwares and liquors. It is the principal seaport of Norway, handling about half of the imports, and nearly one-fifth of the exports. The harbor is very spacious, and is kept open in winter by means of ice-breakers. There is regular steamship communication with Great Britain, Germany, the Netherlands, and France, as well as with Denmark and Sweden. The capital is the seat of a number of consular representatives, including one from the United States. The population, almost wholly Protestant, was 151,239 in 1891, and 227,626 in 1900. The environs are very attractive, offering magnificent views. The average annual temperature of Christiania is 42° F. The city was founded in 1624 by Christian IV., on the site of the town of Oslo, which dated from 1050, and was burned in 1624. Consult Amnéus, *La ville de Kristiania, son commerce, sa navigation et son industrie—Résumé historique* (Christiania, 1900).

CHRISTIANIA, University of. The Norwegian State University. During the union of Norway and Denmark, the Norwegian students frequented the university at Copenhagen; but the awakening of the national spirit at the end of the Eighteenth Century finally compelled the foundation of the Christiania University, under Frederick VI., in 1811-1812, mainly through voluntary subscriptions. In the course of the Nineteenth Century, many buildings have been erected, both by the State and by private contributions. The university is under the control of the Minister of Religion and Education. There were, in 1901, about 1400 students. The library is large, containing 365,000 volumes. The university has a botanical garden and an observatory, besides various laboratories and museums.

CHRISTIANITY (from OF. *Crestiente, Crestientet*, from Lat. *Christianitas*, Christianity, from *Christianus*, Christian). Religion depends upon two elements, the perception of need, and belief in some higher power able to relieve it. Man is very early brought to feel his helplessness in respect to his own life and the things he most needs for its maintenance. He early forms the idea of some higher being, some force of nature, some departed spirit, or some superhuman being, who has the power, even if not the will, to help him preserve his life, or give him food. The moment he turns to this being in supplication and with some degree of trust, that moment he has become a religious being. Thus Schleiermacher was right in defining religion as essentially the feeling of dependence.

As man progresses in knowledge of himself and the world, he is led to see that this world is never free from evils and that he is never lifted to the complete independence of it. Hence he begins to place the chief good for which he strives in another world and a life after this. At the same time his conception of the superhuman being upon whom he depends becomes more elevated, and he begins to view life under ethical considerations, which lend color to his view of the good to be attained in a future state. This process may carry him to a high degree of knowledge of God, immortality, and morality, as it did the ancient Greeks, who found in Plato a channel for the expression of the purest and highest form of religion which any pagan people attained.

Christianity, now, partakes of the character of all religion, in that it is fundamentally a recognition by man of his dependence upon God; but it is distinguished from other religions by the character of the provision which it makes for the satisfaction of the elementary religious demand. It is the religion of salvation, and it provides this through a definite channel, through the work of a Saviour sent from God, Jesus Christ. It is in its own conception the absolute and only true religion. Toward Judaism its relation is that of the perfect to the divinely ordained, but preparatory and imperfect. Toward the various forms of heathenism its relation is that of the pure to the multifariously debased. It recognizes in none of them saving power. If any soul is saved in heathenism (Romans ii. 14-16), it is because it has assumed the same attitude toward God which Christianity requires, and its salvation is granted solely upon the ground of the perfect work of Christ wrought for it as well as others. Without the essential elements of the Gospel, without the atonement of Christ, and without faith (confiding trust) in God, Christianity teaches there is no salvation (Acts iv. 12).

The claim of absoluteness which is made for Christianity is supported by the method in which it originated. It is the religion of revelation. God makes himself known to men by personal communication in a supernatural way. He speaks by chosen messengers (prophets) and sustains their message by divine signs (miracles), and at last, in the fullness of time, sends His own Son, who takes upon Him humanity, reveals God more perfectly than any of His forerunners, performs the work of atonement, and then sends the divine Spirit to work immanently in the soul and be a new power of life, delivering it from the control of sin.

This conception of supernatural origin is essential to Christianity. The great teachers who have left the record of their teachings in the Bible did not obtain their conceptions of truth by the unaided operations of their own minds, as men have discovered the powers of steam and electricity. If the knowledge of truth had grown in this way, it would still have grown under the effective agency of God, as the process of evolution is by the immanent working of His personality (consult Le Conte, *Evolution and Religion*, New York, 1888). But revelation emphasizes that personality. It is accompanied by the sense of personal contact with God. It gives truth which is necessarily recognized as coming from God and not as originating in the human soul. Prophecy and miracles are equally personal. Prophecy is not a merely natural anticipation of the future by any shrewd guessing, or by any special sympathy with the divine mind, enabling man to decipher the riddle of the future, much less is it error and self-deceit. It is God's personal communication to the prophet of the unknown future as it lies in the divine plan. Miracles are also God's present and personal interference in the course of nature. They need not be conceived as destroying any fundamental law of nature, but they are what nature never does and never can do without God, as it never does and never can do a multitude of things which it does without man. And when Jesus Christ comes into the world, the height of the supernatural is reached. He cannot be regarded as an 'ideal man' merely, though He was that. He did not originate as a man by the merely natural processes by which other men originate. His peculiarity is not found in the degree of intimacy with which He communed with God. On the contrary, Christianity regards Him as God come in the flesh. He is God in the centre of His personality, and speaks with the authority and knowledge of God. The work of atonement which He performs is no mere incident in His earthly career, nothing in which men have any part, nor which they can do after Him; but is unique as His person is unique, and neither capable of imitation by man nor proposed for his imitation, although His spirit is, even the spirit in which He wrought this great work (Phil. ii. 5ff.). All the various explanations of the peculiarities of Christianity are natural explanations, and are foreign from the spirit of the system. It is in distinction from and contradiction of them all that it is 'supernatural.' It is not *anti*-natural, and is even *natural*, if in the scope of that word the nature of God and the secrets of eternity are embraced; but it is above nature, as man knows nature.

Thus introduced into the world, Christianity has a corresponding and a peculiar view of the world. By this it is differentiated from other religions as well as by its lofty claims. Christianity does not view the world as miserable, as some Oriental religions do, and recommend self-effacement as the remedy. The world is miserable; but the chief thing is its sin. Christianity views the world as sinful and as condemned before the bar of God for its guilt. The world is a lost world. Christianity does not necessarily reject evolution (q.v.), whereby the race is viewed as progressing upon the whole, and even the Church as developing in grace and knowledge, but it nevertheless regards man as fallen. There was an original sin in the early history of the race, and by heredity this has brought corruption, disorder, disharmony, into all the succeeding generations. The result is that the world is a kingdom of evil. Man was made to know God. Remove this knowledge from him by sin, and he tends to evil, because his upward tendencies depend upon the presence of his designed environment, God. The hopeless ruin of man apart from God springs from the fact that nothing can rise in the scale of moral life, or any other life, when it is deprived of the sole designed agency of its elevation. But with this view of man and the world is combined another. The apparent pessimism is changed to an optimism. Man is capable of salvation, and is, in the divine design, something great and noble. Christianity comes to bring into his history the saving power which shall rescue him from himself and make him again a son of God. It presents to him in Jesus Christ an ideal of purity which, under the ministration of the divine Spirit, convinces him of his sin. The same Spirit produces a new allegiance in his soul, allegiance to God in Christ, creates a new purpose to do the right, animates him by a new affection, that of an all-embracing love, and produces a new obedience to the will of God. The change in him is not a mere change of purpose. It is accompanied with the gift of the Spirit as an abiding, renovating, inspiring, and enabling presence, so that the man finds a new power in himself to overcome the temptations of the world. Christianity puts him, also, in a new society; and it thus saves him. It brings him out from under the condemnation of the law of God, it puts him again in his old position of communion with his Father, and thus it both shows what he was intended to be, and helps him increasingly to attain to that ideal.

Some external organization is, of course, necessary if the work of Christianity is to be done in the world. Accordingly there has always been a Church. The sacerdotal tendency, transplanted from Judaism into early Christianity, strengthened by Augustine (q.v.), and culminating in the Papacy, identified the visible with the invisible Church, made membership in it essential to salvation, and viewed the hierarchy as essential to the being of the Church. This view is largely held in the Anglican communion at the present time. Other Protestant bodies have, however, laid the emphasis upon the invisible Church to such a degree that they have acknowledged the validity of any Church organization which seemed to possess the Spirit of Christ.

The evidences of Christianity vary from age to age according to the needs of that age; they must, however, always consist in the display of the essential meaning of Christianity and its place in the plan of the world. The chief external arguments were formerly derived from the fulfillment of prophecy and from the testimony of miracles. The modern stress upon law in the world has caused a change at this point. Prophecy and miracle themselves have now become an object of attack, and need defense. This is derived from their inseparability from the substance of Christian doctrine and from the truth of that as a whole. The argument for the truth of Christianity as a whole is derived from two principal sources: from history, particularly from Christianity's place in history as a force coöperating with other forces to make history what it is, and that upon its best side; and from the reasonableness of its doctrines and their agreement with the results of every other realm of human knowledge. The internal evidences of Christianity were formerly occupied largely with the character of Christ and the career of the apostles as both exhibiting the presence of a supernatural power. While these arguments have not passed away, and never can, there has been a tendency of late to lay a new stress upon Christian experience as a source of evidence. Not only does the Gospel, when accepted and tried, do for the sinner what it professes itself able to do, and thus prove itself because 'it works,' but the Christian comes to possess an experiential and thus an independent knowledge of the chief truths of Christianity, which is logically independent of the Scriptures and the Church, and is thus able to confirm their claims. Consult Stearns, *Evidence of Christian Experience* (New York, 1891).

The extension of Christianity is no mean argument in its favor and no small evidence of its real character. It early extended with almost incredible rapidity over the Roman Empire. It is still extending, and in the missions of the Nineteenth Century has renewed the triumphs of its youth.

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CHRISTIAN KNOWLEDGE, Society for Promoting. One of the great religious associations connected with the Church of England, and the oldest of them all. It was founded in 1698, although it did not receive its present name till 1701 and had for its object: "(1) To promote and encourage the erecting of charity schools in all parts of England and Wales; (2) to disperse, both at home and abroad, Bibles and tracts of religion; and, in general, to advance the honor of God, and the good of mankind, by promoting Christian knowledge, both at home and in other parts of the world, by the best methods that should offer." These objects it has never ceased to pursue, chiefly directing its efforts to the British dominions; partaking at once of the nature of an educational association, a missionary society, a Bible society, and a religious tract society; and notwithstanding the operations of other great societies in these several departments of Christian benevolence, its revenue amounts to about £100,000 a year. The Protestant missionaries who labored in the south of India in the last century were supported chiefly by this society, which has also contributed largely of its funds for the establishment of Christian schools in that country.

CHRISTIANS, Christian Connection, and Christian Church, South. The religious societies known as Christians originated near the close of the Eighteenth Century in three unconnected movements: (1) James O'Kelly and others, in Virginia, withdrew from the Methodist Episcopal Church in 1793, and in 1794 adopted the name of 'Christians,' and substantially the principles now held by the Christian connection; (2) Abner Jones, a Baptist, led a movement in 1800, under which a church was formed in Lyndon, Vt., and other churches followed. The third movement was begun by Barton W. Stone and other ministers, Presbyterians, in Kentucky and Ohio. A religious magazine was started in 1805, and the *Herald of Gospel Liberty*, still the chief organ of the Christian Connection, began publication in 1808. General meetings have been held since 1819. The Southern Christian Association was formed in 1847, and gave place in 1856 to the Southern Christian Convention. The American Christian Convention (Northern) was formed in 1856 and incorporated in 1872. The Christians hold to the cardinal principles of the Christian faith as generally accepted by the churches, with the Scriptures of the Old and New Testaments as the only and sufficient rule of faith, and the interpretation of the same in the exactness of verbal accuracy; insist that the name 'Christian' is the only appellation needed, while partisan or sectarian names are excluded; maintain that Christian character or vital piety is a just, and should be the only, test of fellowship or church membership; uphold the right of private judgment and liberty of conscience; and teach baptism of believers by immersion, but admit all believers to the communion table. Their seventy-two conferences have power to receive and ordain pastors, but not to pass regulations binding on the churches.

I. Christian Connection. The American Christian Convention, as this body is officially designated, is composed of the conferences of the northern United States and Canada, with some of the Southern conferences represented in it as coöperative, not subordinate bodies. The function of this convention is to work with the conferences for the common good, and furnish direction and leadership. It meets every four years, and is therefore currently called 'the quadrennial.' The Mission Board and Church Extension department is an incorporated department of it, through which home missions (from 20 to 25 missionaries), a foreign mission in Japan, and a new mission in Turkey are sustained; and is assisted by the Women's Home and Foreign Mission Boards. The educational institutions comprise a Biblical Institute at Stanfordville, N. Y., six colleges, a seminary and a correspondence school, and a publishing house at Dayton, Ohio. It has (1900) 984 ministers, 1200 churches, and 84,830 members. Its organs are: *The Herald of Gospel Liberty*, *Christian Missionary* (both Dayton, Ohio); *The Christian Messenger* (New Bedford, Mass.); *The Christian Vanguard* (Canada); and conference and local papers. Consult: N. Summerbell, *Christian Principles: or, Why I Prefer the Christian Church* (Dayton, Ohio, 15th ed. 1901); J. J. Summerbell, *Life and Writings of N. Summerbell* (Dayton, Ohio, 1901).

II. The Christian Church, South. The Christian churches in the South withdrew from the American Christian Convention in 1854, and formed a separate convention in 1856. They were much disturbed during the Civil War, and were reorganized in 1866. The principles of this branch are nearly identical with those of the American Christian Convention. It has six conferences, with 15,328 members; and colored conferences, doing their own work, are mentioned. The Convention has an active home mission association, and coöperates with the American Christian Convention in missions in Japan and Syria. An orphanage is to be established. The institution of learning is Elon College, N. C., where the book depository is also located. Periodical, *The Christian Sun*, Elon College, N. C.

CHRISTIANS, or Disciples of Saint John, or Mendæans (*Mandæans*) (Lat. *Johannitæ*, from *Johannes*, John; the name applied to them by the Carmelites in the Seventeenth Century). A sect in Persia, in the country around Basra. They seemingly deify John the Baptist and consider Jesus an impostor. They say that they dwelt on the Jordan in the time of Jesus, but were driven from Palestine by the Mohammedans. Their name 'Christians' is wholly a misnomer. They consider the Jehovah of the Jews a spurious divinity, and Christ a false teacher; that the world was created by seven angels of darkness who inhabit the seven planets, and there is also a kingdom of light superintended by good angels. Behind these kingdoms is a region of splendor, and there is the supreme original being, Ferha, and the female principle, Ajar. There are conflicts between the worlds of darkness and of light, but light is to triumph. The Mosaic and Christian systems of religion came from the region of darkness; but that of John the Baptist from the region of light. Baptism is the means of introducing men to the kingdom of light. John was married, but his children sprang from the Jordan. These people practice polygamy, and forbid mourning for the dead. They have five sacred books, of which four are doctrinal, and one treats of astrology. It is supposed that 200 years ago they numbered about 100,000, but now their number is estimated at only about 1500. Consult E. Babelon, *Les Mendaites, leur histoire et leurs doctrines* (Paris, 1882).

CHRISTIANSAND, krĕs′tē-ȧn-sänd. An episcopal town of southern Norway, situated at the mouth of the Torridalself, in the Bay of Christiansand (Map: Norway, B 8). The town exports lumber, fish, lobsters, hides, copper, and iron. Its harbor is excellent, and is very much used as a haven in stormy weather. There is regular communication by steamer with the rest of Norway, and with Germany, England, and Denmark. The town is the seat of a United States consular agent. Its fortifications have become useless, because of the fortress built at Flekkerö, 5 miles distant. Population, in 1891, 12,813; in 1901, 14,566. Christiansand was founded by Christian IV. in 1641, and was partially destroyed by fire in 1892.

CHRISTIANSBURG, krĭs′chanz-bûrg. The county-seat of Montgomery County, Va., 30 miles southwest of Roanoke, on the Norfolk and Western Railroad (Map: Virginia, D 4). It is known as a summer resort, and is the centre of a large stock-raising district. The town owns and operates its electric-light plant. Settled about 1770, Christiansburg was incorporated in 1832, and is governed at present under a revised charter of 1854. Population, in 1900, 659.

CHRISTIAN SCIENCE. A term given by Mrs. Mary Baker Eddy, of Concord, N. H., to a religio-scientific discovery which she declares to have been made by her in the year 1866.

It purports to reveal the science of God, and to declare the actual truth about Deity; also the science of life and of man, both of which have been regarded as a mystery. It professes to be the science of the divine Mind, or Omniscience, and the science of Jesus' mission and teaching—the science of Christianity.

Christian Science affirms the divine individuality or infinite spiritual personality of God, and denies all man-made conceptions of Him as a finite personality of anthropomorphic nature or presence. It declares that God can only be spiritually or supersensibly discerned, and that the so-called material senses cannot cognize or comprehend God. In defining God, according to Christian Science, Mrs. Eddy adds to the generally accepted synonyms for Deity, such as Life, Truth, Love, and Spirit, the further declaration that God is the Divine Principle of all true being, meaning thereby that He is the creative principle, the cause, origin, source, basis, foundation, government, and law of all that has actual and permanent existence. She also declares that God is Substance, meaning thereby that Spirit, Mind, is the only actual, immortal substance or reality. In defining God as Good, she holds that the divine consciousness includes only the consciousness of good. She repudiates all assumption that God has created or consented to any form of evil, sin, sickness, or death, or that the fundamental law of being provides for the inception and continuance of sickness. She declares that all of God's laws mean and provide for life, and life only.

Christian Science purports to solve the mystery of evil. It denies the personality of evil as devil, and avers that evil has no real entity or immortality. Sin or evil is a negation—a wrong sense of the truth of being—a wrong sense of that which is eternally right. Christian Science denies the supposed naturalness of sin, sickness and death, and declares them to be abnormities or monstrosities of the 'carnal mind,' or 'mortal mind,' as it is termed in Christian Science—the paraphernalia of an ignorant and depraved sense of existence which can be mastered and lawfully abolished.

Christian Science acknowledges the Messiahship of the divine Christ as the manifested mediatorial link between sinning and suffering mortals and the divine Love, God. It declares that Jesus exhibited and taught the power of God to heal and to save, and that Jesus' works, instead of being unnatural and in contravention of law, were divinely natural, scientific, and in demonstration of divine order. It claims to remove the entire ministry of Christ from the realm of impenetrable mystery, and to present it as a lawful manifestation of the divine immanence—as the availability and adaptability of the truth or science of being. It pronounces sin and sickness the works of the devil, which Jesus came to destroy, and declares that salvation through Christ, which He demonstrated, naturally includes the healing of the sick as well as the reformation of the sinner.

In reference to the cure of disease, it asserts that the primary cause of sickness is to be found in the mental realm. It declares that fear, sin, superstition, ignorance, and a depraved, erroneous, fatal philosophy constitute the primal cause of bodily degradation and depletion and have involved the human race in mortality, and the statement is made prophetically that when the world fully learns this fact, it will, for the first time, begin to cope scientifically with and permanently master disease. It declares as a scientific postulate that 'all manner of diseases' are curable and that the practice of Christian Science is attesting this statement by healing all of the diseases heretofore regarded as incurable, such as malignant cancers, etc.

As a religious denomination, Christian Scientists believe in God, in the inspiration of the Scriptures, in the divinity of Christ, in the supremacy of God as Spirit, in prayer without ceasing, and in all the essentials of Christianity, and claim that the prime office of Christian Science is to destroy evil and reform mankind. They believe that all evil will eventually be destroyed and become extinct.

This denomination had in 1902 about seven hundred established church societies or congregations in the United States, Great Britain, Canada, Germany, and France, many of which have acquired large and costly church edifices. At the head of these is what is called the 'Mother Church' in Boston, Mass., with a membership of nearly 30,000, and of which Mrs. Eddy is the pastor emeritus.

There is no central denominational government. The Mother Church, through its 'manual,' or Church by-laws, exercises some control over the denomination as a whole, but the local or branch churches have a purely congregational form of organization and government. The denomination maintains a 'publishing society,' and issues a monthly magazine, *The Christian Science Journal*, and a weekly paper, *The Christian Science Sentinel*. The publishing house is in Boston, and the denominational literature is actively distributed. Reading-rooms, generally open daily, are maintained in connection with most of the churches.

As the discoverer of this science and the founder of the incidental religious movement, Mrs. Eddy has been and is the logical and inevitable leader of the denomination and its activity. She has written several works concerning Christian Science, the principal one being *Science and Health, with Key to the Scriptures*, which is known as the Christian Science textbook. This book states that this science is utterly unlike faith cure, prayer cure, spiritualism, theosophy, mesmerism, or hypnotism, and that the healing is accomplished naturally, scientifically, and according to law, in demonstration of fixed principles and accurate rule.

Although there are no compiled statistics available, the Christian Scientists estimate their numerical strength as nearly a million of people throughout the world, very many of whom believe that they have been healed of supposedly incurable diseases.

For a complete statement of the Christian Science belief, consult Eddy, *Science and Health, with a Key to the Scriptures* (226th ed., Boston, 1902, and many editions since).

CHRISTIANSEN, krĭs′tē-än-sen, Arne Einar (1861—). A Danish dramatist, unconventional, but noteworthy for his mastery of the playwright's art. His first play, *Lindow's Bairns* (1881), was a prose comedy. He then passed several years in travel in various European countries and the Orient. On his return he turned to tragedy in *Nero* (1885), and afterwards wrote, besides prose dramas, several romantic historical plays in verse.

CHRISTIANSEN, Christian (1843—). A Danish physicist, born in Loenborg. He studied in Copenhagen, subsequently taught at the school of technology there, and in 1886 became professor of physics in the university. He carried out several interesting investigations on subjects of natural philosophy, and wrote general scientific works in Danish, including an introduction to mathematical physics (1887-89). Among his original contributions to physics, his researches on radiant heat deserve mention.

CHRISTIANSFELD, krês′tê-*a*ns-felt (Ger., Christian's field). A settlement of Moravian Brethren, in the northern part of Schleswig, about two miles from the Danish frontier, founded in 1772 (Map: Germany, C 1). The houses, which are well built and cheerful in appearance, are arranged in two parallel streets, with the church upon a green plot in the middle. There is a coöperative farm, and there are manufactures of soap, candles, leather, and tobacco. Population, less than 1000.

CHRISTIANS OF SAINT THOMAS. The name of a branch of the Christian Church still existing on the Malabar Coast, southwestern India, hence called by themselves the Syrian Church of Malagala, formed originally by excommunicated Nestorians, although it claims the Apostle Thomas as its founder. In the Eighth Century it received a metropolitan from the Nestorian patriarch. The liturgy is in the Syriac language. They still celebrate the early agape, or love feast, use bread, salt, and oil in the communion service, and anoint infants on baptism. Their priests are allowed to marry. Consult: Hugh, *History of Christianity in India* (4 vols., London, 1839-45), and the monograph by W. Germann, *Die Kirche des Thomaschristen* (Gütersloh, 1877).

CHRISTIANSTAD, krês′tê-än-städ, or **KRISTIANSTAD** (Swed., Christian's city). A town in southern Sweden, situated on the Helge, about 14 miles from the Baltic and 265 miles southwest of Stockholm (Map: Sweden, F 9). It is regularly built and possesses an arsenal and a magnificent church, and is the seat of a court of justice. Its fortifications were destroyed in 1847. The chief manufactures are woolen stuffs, tobacco, leather, and gloves, while the trade in brandy and grain is considerable since the river has been made navigable to this point. Population, in 1892, 9686; in 1901, 10,318. The town, which was founded by Christian IV. of Denmark in 1614, came into the hands of Sweden in 1648, and had suffered many sieges during the wars between Denmark and Sweden.

CHRISTIANSTED, krês′tê-*a*n-stĕd (Dan., Christian's city). The capital of the Danish West Indies, and the chief town of the Island of Santa Cruz (Map: West Indies, P 6). It stands on the northeast coast of the island, and has an excellent harbor which is defended by a fort and a battery. The population numbers about 10,000.

CHRISTIANSUND, krês′tê-*a*n-su̧nd (Norweg., Christian's sound). A seaport on the west coast of Norway, 85 miles west-southwest of Trondhjem, situated on four small islands (Map: Norway, B 5). It is a very flourishing town, having an excellent harbor formed by the islands. It exports great quantities of fish. It has also a thriving coast trade, which is carried on in its own ships. Population, in 1891, 10,381; in 1901, 12,043. The town was called Christiansund in 1742, in honor of Christian VI., who gave it its privileges.

CHRISTIAN UNION, Independent Churches of Christ in. The Christian Union churches were formed in Ohio during the first years of the Civil War, when enthusiasm for the war in defense of the national Union against secession was strong in the Northern churches, and the duty of supporting the Government was freely preached by their ministers. Under the leading, principally, of the Rev. J. Flack, previously of the Methodist Episcopal Church, church members who were opposed to the war, and those who disapproved of what was called political preaching, were gathered into separate congregations. After the period of the war and re construction, the aim of these churches gradually became to promote Christian unity and undenominationalism. At the General Council of 1878 a paper defining the position of the organization was adopted which was essentially the same in terms with the declaration of the Christian Connection, and the Christian Union churches became affiliated with that body in 1890. At that time they had, according to the census of 1890, 294 congregations, with 18,214 communicant members, in 17 States.

CHRISTIAN VERGIL (translation of Lat. *Vergilius Christianus*). An epithet given to Marco Girolamo Vida.

CHRISTIAN YEAR, The. A religious work by John Keble (1827), containing the reflections appropriate for the Sundays and holy days throughout the year. It is marked by deep religious sentiment, love of nature, and domestic affection.

CHRISTIAS, krĭs′tĭ-*a*s. See Vida, Marco Girolamo.

CHRISTIE, krĭs′tĭ, Richard Copley (1830-1901). An English scholar and bibliophile, born at Lenton, Nottinghamshire. He matriculated in 1849 at Lincoln College, Oxford (where began his friendship with Mark Pattison), and afterwards studied for the bar. In 1854 he received the appointment of professor of history at Owens College, Manchester, recently founded, and later he was given the chairs of political economy and commercial science, and jurisprudence and law. The last of these appointments he resigned in 1869, but his connection with the college, as one of its governors and most interested advisers, lasted until his death. From 1872 to 1893 he was chancellor of the diocese of Manchester. Christie left to Owens College his rare library, containing one of the largest private collections of editions of Horace (800 volumes), as well as his collection of Renaissance literature. As an author his most important book is *Etienne Dolet, the Martyr of the Renaissance* (1880; rev. ed. 1899), which was translated into French by C. Stryienski (1886), and is worthy to be classed with his friend Pattison's *Casaubon*. Among other works by him are valuable studies of certain Renaissance characters. His bibliographical writings include: *The Marquis de Morante: His Library and its Catalogue* (1883); *Catalogues of the Library of the Duc de la Vallière* (1885); *Elzevir Bibliography* (1889); and *Chronology of the Early Aldines* (1895). The most notable of his works are collected in the *Selected Essays and Papers of Richard Copley Christie*, edited, with a memoir, by W. A. Shaw (1902).

CHRISTIE, William Henry Mahoney (1845—). An English astronomer, born at Woolwich. He received his education at King's College School, London, and at the University of Cambridge. In 1870 he was made chief assistant at the Royal Observatory of Greenwich, and in 1880 secretary of the Royal Astronomical Society. In 1881 he succeeded Airy as astronomer royal. His published works include a *Manual of Elementary Astronomy* (1875), and a number of valuable technical papers contributed to scientific periodicals.

CHRISTINA, krē-stē′nȧ. Queen of Spain. See Maria Christina.

CHRISTINA (1626-89). Queen of Sweden from 1632 to 1654. She was the daughter of the great Gustavus Adolphus, and was born December 18, 1626. She became Queen after the death of her father in the battle of Lützen, in 1632. Till 1644 she reigned under a regency headed by the Chancellor Oxenstierna. Distinguished by the possession of a lively imagination, a good memory, uncommon intelligence, and remarkable aptitude for serious study, she received the education of a man rather than that of a woman, and to this may in part be attributed the many eccentricities of her life. Her subjects and counselors earnestly desired her to marry, but the Queen's restless spirit would accept no such bond. In 1649 she had her cousin, Charles Gustavus (see Charles X.), declared her successor by the Estates of the realm. Her reign was notable for the patronage of learning and science; but the Queen was too eccentric and cared too little for politics to give that force to the administration which the position of Sweden in Europe at that time, and its own lively internal politics, required. In 1654 Christina voluntarily abdicated in favor of her cousin, reserving to herself sufficient revenues, her entire independence, and supreme authority over her suite and household. She embraced Roman Catholicism, and afterwards resided chiefly in Rome and in France, gathering about her a court of brilliant and learned men, and spending much time in literary and scientific pursuits. She covered herself with infamy by the murder in 1657 at Fontainebleau of her grand equerry and favorite, Monaldeschi. After the death of Charles Gustavus in 1660, Christina repaired to Sweden and began to intrigue for the recovery of her throne; but her subjects cut short her pretensions by forcing her to sign another formal act of abdication. She died April 19, 1689. Consult: Geyer, *Geschichte Schwedens*, Vol. III. (Hamburg, 1836); Archenholtz, *Vie de Christine par elle-même* (Stockholm, 1751); Bain, *Christina, Queen of Sweden* (London, 1889).

CHRISTINE DE PISAN, krē′stēn′ de pē′zäN′ (1363-1431). A French writer. She wrote some controversial and historical prose, and considerable didactic verse, such as *Le chemin de longue estude* and the *Poème de la pucelle*. These works serve the historian as valuable pictures of the state of society in that day. There is an edition of her *Œuvres poétiques* by Roy (1887-92). For her biography, consult Robineau (Paris, 1883).

CHRIS′TISON, Sir Robert (1797-1882). A Scottish physician. He was born in Edinburgh, studied medicine there, and afterwards went to Paris to study chemistry and toxicology, the latter under the celebrated Orfila. It was in that department of medical science that he later became especially eminent. He was twice president of the Edinburgh College of Physicians; was ordinary physician to the Queen in Scotland; was created a baronet on Mr. Gladstone's recommendation in 1871; and received many other honors. He was best known for his *Treatise on Poisons* (1829). Consult his *Life*, edited by his sons (Edinburgh and London, 1885-86).

CHRISTLIEB, krēst′lēp, Theodor (1833-89). A German theologian, born at Birkenfeld, Württemberg. He was educated in Tübingen, taught in France, and preached in London from 1858 to 1865: returned to Germany, and in 1868 was made professor of practical theology and university preacher in Bonn. In 1873 he was a delegate to the Evangelical Alliance in New York. His best-known works, translated into English, are: *Modern Doubt and Christian Belief* (4th ed., 1879) and *Protestant Foreign Missions: Their Present State* (1880). He published several books on missions.

CHRISTMAS, kris′mas (ME. *Cristmas, Cristesmesse*, Christ's mass). The day on which the nativity of the Saviour is observed. The institution of this festival is attributed by the spurious decretals to Telesphorus, who flourished in the reign of Antoninus Pius (A.D. 138-161); but this is unhistorical. It is unknown just when it originated, but surely December 25 was not generally observed as the day prior to Chrysostom's time (Fourth Century) in the Eastern Church, although much earlier in the Western; for there was no uniformity in the period of observing the Nativity among the early churches; some held the festival in the month of May or April, others in January. It is, nevertheless, almost certain that December 25 cannot be the nativity of the Saviour, for it is then the height of the rainy season in Judea, and shepherds could hardly have been watching their flocks by night on the plains.

Christmas not only became the parent of many later festivals, such as those of the Virgin, but especially from the Fifth to the Eighth Century gathered round it, as it were, several other festivals, partly old and partly new, so that what may be termed a *Christmas cycle* sprang up, which surpassed all other groups of Christian holidays in the manifold richness of its festal usages, and furthered, more than any other, the completion of the orderly and systematic distribution of Church festivals over the whole year. Not casually or arbitrarily was the festival of the Nativity appointed for December 25th. Among the causes that coöperated in fixing this period as the proper one, perhaps the most powerful was that almost all the heathen nations regarded the winter solstice as a most important point of the year, as the beginning of the renewed life and activity of the powers of nature, and of the gods, who were originally merely the symbolical personifications of these. In more northerly countries, this fact must have made itself peculiarly palpable; hence the Celts and Germans, from the oldest times, celebrated the season with the greatest festivities. At the winter solstice the Germans held their great Yule feast, in commemoration of the return of the fiery sun-wheel, and believed that during the twelve nights reaching from December 25th to January 6th they could trace the personal movements and interferences on earth of their great deities, Odin, Berchta, etc. Many of the beliefs and usages of the old Germans, and also of the Romans, relating to this matter, passed over from heathenism to Christianity, and have partly survived to the present day. But the Church also sought to combat and banish—and in this it was to a large extent successful—the deep-rooted heathen feeling, by adding, for the purification of the heathen customs and feasts which it retained, its grandly devised liturgy, besides dramatic representations of the birth of Christ and the first events of His life. Hence sprang the so-called 'manger' songs and a multitude of Christmas carols, as well as Christmas dramas, which, at certain times and places, degenerated into farces or fools' feasts (q.v.) Hence, also, originated, at a later period, the Christ trees, or Christmas trees, adorned with lights and gifts, the custom of reciprocal presents and of special Christmas meats and dishes, such as Christmas rolls, cakes, currant loaves, dumplings, etc. Thus Christmas became a universal social festival for young and old, high and low, as no other Christian festival could have become. At one time the festivities were continued until Candlemas and Twelfth Day.

In the Roman Catholic Church each priest celebrates three masses at Christmas, viz. at midnight, at daybreak, and in the morning. The day is also observed religiously by the Anglican and Lutheran churches. The Scotch Presbyterians and English Nonconformists generally rejected all religious observance of the day as a 'human invention' and savoring too much of 'papistry.' It is said that the Puritan founders of New England established the Thanksgiving festival as, in some measure, a substitute for Christmas. At the present time the tendency is strong toward religious observance of the day in all Protestant bodies.

CHRISTMAS BOX. A small money gift to persons in an inferior condition on the day after Christmas, which is hence popularly called *Boxing Day*. The term and also the custom are essentially English, though the making of presents at this season and at the new year is of great antiquity. A number of interesting particulars concerning the Christmas box will be found in Brand's *Popular Antiquities* (London, 1849).

CHRISTMAS CARDS. Pictured souvenirs appropriate to Christmas, which modern fashion has introduced into the social world. The earliest example of this art is attributed to J. C. Horsley, R.A., who in 1846 made designs of this character. Subsequently the demand for these tokens has become enormous, and at present Christmas cards are often of much artistic merit in both design and coloring.

CHRISTMAS CAROL. See CAROL.

CHRISTMAS CAROL, THE. A Christmas story by Charles Dickens, published in 1843. It narrates the regeneration of the miser Scrooge by the kind offices of 'Marley's Ghost.' The story was published in London by Chapman & Hall, and 15,000 copies, bringing the author over £700, were soon sold.

CHRISTMAS ISLAND. A small island in the Indian Ocean, in latitude 10° 30′ S. and longitude 105° 45′ E., and about 250 miles south of the western end of Java. It has not a very good anchorage, but has been colonized recently from the Cocos Islands, chiefly for the purpose of working valuable beds of phosphate of lime. It is under British control, and administratively belongs to the Straits Settlements.

CHRISTMAS ISLAND. A large, low atoll in the Pacific Ocean, in about latitude 2° N. and longitude 157½° W. It has a good anchorage, and belongs to the British Government. It was discovered by Cook, in December, 1777.

CHRISTMAS ROSE. See HELLEBORE.

CHRISTMAS PANTOMIMES. Harlequinades given at Drury Lane and Covent Garden

Theatres at Christmas time. The institution dates from the end of the Seventeenth Century, and reached its highest point under Garrick. The performance usually opens with the representation of some fairy tale, the characters of which change to the harlequin, columbine, and clown of the pantomime which follows.

CHRIS'TODO'RUS OF COPTUS (Gk. Χριστόδωρος Κοπτεύς, *Christodōros Kopteus*). A Greek poet resident in Egypt, belonging to the close of the Fifth and the beginning of the Sixth Century A.D. His three books of epigrams have perished, with the exception of two epigrams preserved in the *Greek Anthology*. He is best known for his description in 416 hexameter verses of the statues contained in the gymnasium of Zeuxippus, in Constantinople. This poem has considerable value for both literature and the history of art.

CHRISTOL'OGY (from Gk. Χριστός, *Christos*, Christ + λογία, *logia*, account, from λέγειν, *legein*, to say). A technical term in theology, signifying the doctrine of the person of Christ, or the answer to the question, What is the relation of the divine and human in Christ? The elements of the problem may be said to have been given by the original and unvarying conviction of the Church. That Christ was man was too plain to be denied by any. On this depended the very possibility of our salvation (Heb. ii. 17, 18). But no less plain did it seem from the beginning, to the Apostles (John i. 14) and to the humble men who bore the first testimony to Christ by the surrender of their lives (Ignatius, *Eph.* vii., etc.), that He was truly God. On the subtleties of this problem they did not dwell; but it certainly never occurred to them to divide His personality. And so, when more careful reflection was forced upon the Church, the question was one of adjustment of accepted truths. How could divinity and humanity co-exist in the unity of one person?

There were early answers to the question which were tentative, and soon rejected as incorrect. The Gnostics (q.v.) generally made the humanity a mere appearance: but their whole system was recognized as anti-Christian. The various theories of the Trinity which arose while the preliminary question as to the relation of the divine in Christ to the Father was under discussion, directly affected the Christological problem. Those which denied the Trinity (Patripassianists, Sabellians) solved the problem by removing one of its elements. Arius made the divine in Christ, and the rational principle as well, the (created) logos. Trinitarians also put forth some theories which were rejected as denying more or less the elements of the problem instead of reconciling them. Such were those of Apollinaris (q.v.), who taught that the humanity of Christ was abridged, and that the place of the self-determining principle (the νοῦς) was occupied by the divine Logos; and of Eutyches (q.v.), who held that after the incarnation there was but one nature, the human being absorbed in the divine. Nestorius (q.v.) held firmly to the two natures, but dissolved the personality, making Christ a twofold person, the natures subsisting in 'conjunction.'

By the time of the Council of Chalcedon (451) these various efforts at explanation, resulting in the essential modification of some element of the theanthropic person, had all been thought through and all finally condemned. The Church was ready to adopt a creed which reaffirmed all the three elements of the problem in the following words: We confess "one and the same Son, our Lord Jesus Christ, the same perfect in Godhead and also perfect in manhood; truly God and truly man, of a reasonable soul and body; consubstantial with the Father according to the Godhead, and consubstantial with us according to the manhood; in all things like unto us, without sin; begotten before all ages of the Father according to the Godhead, and in these latter days, for us and our salvation, born of the Virgin Mary, the mother of God, according to the manhood; one and the same Christ, Son, Lord, only begotten, to be acknowledged in two natures, inconfusedly, unchangeably, indivisibly, inseparably; the distinction of natures being by no means taken away by the union, but rather the property of each nature being preserved and concurring in one person and one substance, not parted or divided into two persons, but one and the same Son and only begotten, God the Word, the Lord Jesus Christ."

This definition of the Council of Chalcedon fixed the fundamental doctrine of the Church as to the natures and person of Christ and excluded all the antecedent heresies. The two distinct natures, the divine and the human, are united in one person. To hold otherwise would be to assert with Nestorius that there are two sons and two Christs. Amongst the important corollaries following from these principles of faith as thus laid down are: (1) Christ's human knowledge as distinct from that which belonged to him as God; (2) His absolute sinlessness; (3) the fullness of all grace in Christ; (4) the reality of His human body subject to those defects common to all mankind in order to the satisfaction of the sins of human nature; (5) the predication of the divine attributes to Christ the man, and of the human attributes to God the Son. But with the Reformation this fundamental problem was brought afresh before the mind of the vigorous young Protestant movement. The Lutheran theologians made a strong effort to solve the difficulty, rightly perceiving that it lay in maintaining the unity of the person, the reality of the two natures being established beyond dispute. The solution proposed was the 'communication of properties' whereby the divine was supposed to have communicated its peculiar property to the human, and the human its peculiarity to the divine. Hence the two became similar, and there was no further difficulty in supposing a union in one personality. But this theory was finally generally rejected, and has to-day little standing even among Lutherans. How the human could take on the divine, the material body becoming omnipresent, did not grow clearer as time went on. The only Christology which the Reformation period may therefore be said to have contributed to modern times was the Socinian, which revived that of the earlier anti-Trinitarians, and eventually maintained that Christ was a mere man.

During the past century there has been a great deal of interest taken in Germany, in particular, in the Christological problem, and three strenuous and distinct theories of Christ's person have been set forth. Professor Dorner of Berlin began, not with the person of Christ, but with the two natures, saying that, as the person resulted from the union of the natures, it could not be understood till the natures of which it was composed were understood. The humanity of Christ is, therefore, the full human personality, with full self-consciousness and self-determination. The divine nature is unchangeably the same, performing all its divine offices after the incarnation as before, and possessing all its divine attributes. It is omnipotent and omniscient. But the humanity is neither of these; and hence the divinity cannot impart itself completely to the humanity, and can, of course, less to the child Jesus than to the man. Hence the incarnation is viewed as the gradual impartation of the Logos to the man Jesus, increasing with his development, and perfect only after the ascension. This view seems to fail because it leaves us with only a man in whom God dwelt, and not with divinity and humanity in the unity of one person.

Hence the second theory, that of the "kenosis," begins at a different point, at the one person of Christ, which person the Kenotics make to be the eternal Logos of God. This person takes upon himself humanity, and makes it so his own that its experiences become truly his experiences. He enters into all its development as his own development, so that his consciousness is a truly human consciousness, while it is still the consciousness of the divine element in Christ. This can only be as the divine limits himself to the capacities of the humanity which he assumes. The theory of the kenosis therefore teaches that the eternal Logos, by a conscious divine act of self-limitation, 'emptied' himself of his divine form of existence and took upon himself the human form of existence (Phil. ii. 7). Thus, while He was in essence unchanged, He did not have in exercise, and hence not in conscious possession, the divine attributes of omnipotence, omniscience, etc., but exercised the absolute power and knowledge under the limitations of His human form of existence. The unity of the person of Christ is thus secured because into it nothing enters of the divine which so far transcends the human as to be irreconcilable with it, and it is the unity of the divine self-consciousness. This theory is growing in favor with men of conservative and churchly tendencies; but it cannot be said yet to have fully established itself even among them. The possibility of such a self-limitation of the divine has not been made indisputably clear.

The last theory, if it can be called such, is that of Ritschl. Weary of all the long ontological disputes of the centuries, Ritschl sought to render them all unnecessary by a strict limitation of theology to that which is of 'interest' to men, that is, that which furthers the religious life. While he held, therefore, to the divinity of Christ in the true sense, he refused to attempt the explanation of its consistency with His humanity, regarding it as great a mystery as the consistency of the divine government with human freedom. In Christ we have God. That is enough. Whether He preëxisted or not, and what the nature of the Trinity is, are questions which do not 'interest' us. If we knew all about the preexistence of Christ, it would rather separate Him from us than render faith in Him easier or more sincere. The kenosis is 'romancing.' It explains the incredible by the more incredible. We must give up definitely the two natures and all attempts to unite them. In the true humanity of Christ we have God. How, we do not know. This view, which falls in with the tendencies of the times to deny the miraculous and supernatural and to seek simplicity, is also spreading rapidly among the more radical theologians. But it scarcely seems to offer substance enough to prove a final resting-place for any one. The future lies in the hands either of Chalcedon better explained, or of pure humanitarianism.

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CHRISTOPHE, krēs′tōf′, Henri (1767-1820). A negro King of Haiti. He was born a slave in the island of Grenada, purchased his freedom, and settled in the French portion of Haiti, it would seem, either as a butcher or a plantation overseer. In the insurrection against the French he gained fame as one of the ablest lieutenants of Toussaint L'Ouverture. He held out bravely against General Leclerc for some time in 1802, and, after laying down his arms, took part with Dessalines in the successful rising of 1803. During the short-lived Government of Dessalines, who was slain by a military conspiracy in 1806, Christophe was general-in-chief of the Haitian Army. In February, 1807, he was appointed President of Haiti for life. A republic being about the same time organized at Port-au-Prince, with Pétion at its head, a protracted civil war ensued. In 1811 Christophe was proclaimed King of Haiti, by the name of Henry I., and was crowned June 2, 1812. By his power and skill Christophe was enabled to counteract the attempts made by France to regain its authority in the island. His avarice and cruelty led to an insurrection, which was aided by General Boyer, who had succeeded Pétion in 1818. The rebellion spread to the capital and Christophe's deposition was proclaimed at the head of the troops. Deserted by his body-guard and his nobles, he shot himself October 8, 1820. He left a code of laws, which he called the Code Henri, in imitation of the Code Napoléon. Consult: Hozard, *Santo Domingo, Past and Present: with a Glance at Haiti* (London, 1893); Madiore, *Histoire de Haiti* (Port-au-Prince, 1897). See Haiti.

CHRIS′TOPHER, Saint. A saint of the Roman Catholic and Greek churches. He is supposed to have suffered martyrdom about the middle of the Third Century. According to vulgar legend, Christopher, whose name was originally 'Αδόκιμος, *Adokimos* (the ignoble, base), was a native of Palestine, Syria, or Lycia, and a person of prodigious bulk and strength. His height was twelve feet. So proud was he of his gigantic frame that he would serve only the mightiest princes. Having attached himself to one, who passed for the greatest of his day, Christopher stayed with him for a short time, but soon discovered that his master was terribly afraid of the devil, in consequence of which Christopher, with fearless consistency, passed into the service of the latter. One day, however, when the devil and he chanced to be walking through a wood, they came across an image of Christ. His new master exhibited such perturbation and alarm at the sight that Christopher entirely lost confidence in him, and resolved to find out the Saviour, and follow him. For a long while he searched in vain, but finally he fell in with a hermit, who showed him Christ, and baptized him. Christopher despised the customary penances, and, in consequence, it was imposed on him to carry Christian pilgrims on his shoulders over a stream which had no bridge. One day a little child came to the stream; Christopher took it on his shoulders, but soon began to sink under the weight of his burden. The child was Christ himself, and to prove it, he commanded Christopher to thrust his staff into the ground. He did so, and next morning it had blossomed into a palm-tree bearing fruit. This miracle converted thousands to Christianity. Christopher's success excited the enmity of Dagnus, the prefect of that region, who put him in prison, scourged him with red-hot rods, put a burning helmet on his head, and clapped him on a burning stool. Christopher still remained uninjured. Multitudes of poisoned arrows were now discharged against him, but they rebounded from his charmed body, and one even ,wounded the prefect himself in the eye. Christopher pitied his tormentor, and freely offered his head to the executioner, that the prefect might be healed by the blood which should flow from it. This was done, and, as a matter of course, Dagnus and his family became Christians. The Greek Church celebrates his festival on May 9; the Roman Catholic, on July 25.

Saint Christopher was greatly invoked in times of pestilence, or when people were digging for treasures, to frighten away the spirits who watched over them. The formula used was called a *Christopher's prayer.* He was also the patron of an order of moderation, founded in Austria in 1517, for the purpose of checking excessive drinking and swearing, and which was called the Order of Saint Christopher.

CHRISTOPHER NORTH. The pen name of Professor John Wilson (q.v.)..

CHRISTOPHLE, krē'stō'fl', Albert Silas Médéric Charles (1830—). A French jurist. He was born in Domfront (Orne) and studied law in Caen. In 1876 he became Minister of Public Works in the Dufaure Cabinet and greatly improved the department under his charge, placing competent engineers at the head of every branch of the service. He retained the portfolio of public works in the Simon Ministry, but resigned with the rest of the Cabinet in May, 1877. He was appointed director of the Crédit Foncier in 1878. In 1877 he traveled through France and visited several foreign countries (notably Holland) for the purpose of studying railroad improvements.

CHRISTOPH'ORUS. Pope from November, 903, to June, 904. He thrust out of office and imprisoned his predecessor, Leo V., only shortly afterwards to experience the same treatment.

CHRISTOP'ULOS, Athanasios (1772-1847). A modern Greek poet, born in Kastoria (European Turkey). He studied in Buda in Hungary, and in Padua, and later became a judge successively in Jassy and Bucharest. In that capacity he prepared a legal code for Wallachia. He translated the fragments of Sappho and the first book of the *Iliad* into modern Greek, and wrote a grammar of modern Greek (1805), and published unimportant philological studies. His best-known literary work is his collection of Anacreontic songs (2 vols., 1833; in German, 1880), which has long continued popular in Greece.

CHRIST'S COLLEGE. A college in Cambridge, Eng., founded in 1505 by Lady Margaret Beaufort, Countess of Richmond and Derby, and mother of Henry VII. There was an older foundation called God's House, which had been established by William Byngham, rector of Saint John Zachary, London, in 1439, for the study of grammar, and the training of grammar-school teachers. It had consisted of a proctor and twenty-four scholars, but had fallen on evil days, had lost its original site by being moved to make room for King's College, and had sunk in numbers and standing. It was refounded for a master, twelve fellows, and forty-seven scholars, and liberally endowed. Various additions were made to its numbers by gifts of Edward VI., Sir John Finch, and Sir Thomas Baines. There were, in 1902, fifteen fellowships, thirty scholarships, several sizarships, and some studentships in divinity. Among the eminent men who have studied at Christ's College are Archbishops Grindal and Bancroft, and Latimer, Cudworth, Quarles, Paley, Milton, and Darwin.

CHRIST'S HOSPITAL. An English educational institution better known as the Blue-Coat School. It was founded on the site of the Greyfriars' Monastery, Newgate Street, London, by Edward VI., in 1553, as a hospital for orphans and foundlings. It has been one of the largest and most important schools of its class in England, including a preparatory school at Hertford, and affording instruction to some eleven hundred boys and ninety girls, the latter entirely at Hertford. Boys are admitted between seven and ten and discharged at fifteen, except the 'King's boys,' who attend the mathematical school (founded in connection with Christ's Hospital in 1672, by Charles II.), and the 'Grecians,' the highest class of scholars, of whom four are annually chosen by examination to be sent to each of the universities, Oxford and Cambridge, on scholarships. The right of 'presentation,' or giving a boy or girl a place in the school, is vested in the managing governors, consisting of the Lord Mayor of London, the aldermen, and twelve common councilmen, besides the 'donation governors,' consisting of all noblemen and gentlemen who donate £500 to the school. The education of the boys, originally strictly classical, has of late tended more to commercial training. The dress which has been worn by the boys since the days of Edward VI., and from which the school takes its name, is most picturesque. It consists of a long blue woolen gown or coat, reaching nearly to the feet, with a narrow red leather girdle around the waist, knee-breeches and yellow stockings, and clergymen's bands. Originally a blue worsted cap was worn, but nowadays the boys generally go about bareheaded. The original building, nearly destroyed by the great fire of London, 1666, was restored after the designs of Christopher Wren, and this building in turn, having fallen into decay, was replaced in 1825 by Mr. Shaw. The Newgate Street property was in 1889 ordered sold, and the cornerstone of the new institution was laid at Horsham (about 34 miles from London, in Sussex) in October, 1897. On April 18, 1902, the Blue Coats, assembled on the quadrangle, heard the farewell address of the headmaster. There will be boarding accommodations at Horsham for 700 boys and 500 girls, and a total of 2320 children will be educated there, to nearly half of whom both board and training will be free. In the past there have been many distinguished men connected with Christ's Hospital, notably Coleridge, Lamb, and Leigh Hunt.

CHRIST'S THORN. See JUJUBE.

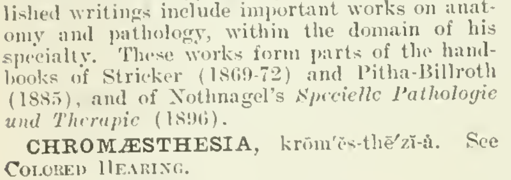
CHRISTY, krĭs'tĭ, HOWARD CHANDLER (1873—). An American magazine illustrator, born in Morgan County, Ohio. In 1893 he began illustrative work for periodicals. He became best known for his depictions of society folk in stories of manners. He also executed pastel series for reproduction in color, and prepared the drawings for Winston Churchill's *The Crisis* (1901) and other volumes of fiction.

CHROBAK, krō'bȧk, RUDOLF (1843—). An Austrian physician, born in Troppau, Silesia. He studied in Vienna, where he became professor of obstetrics and gynæcology in 1879. His published writings include important works on anatomy and pathology, within the domain of his specialty. These works form parts of the handbooks of Stricker (1869-72) and Pitha-Billroth (1885), and of Nothnagel's *Specielle Pathologie und Therapie* (1896).

CHROMÆSTHESIA, krōm'ĕs-thē'zĭ-ȧ. See COLORED HEARING.

CHROMATES. See CHROMIUM.

CHROMAT'IC (Fr. *chromatique*, It. *cromatico*, Lat. *chromaticus*, from Gk. χρωματικός, *chrōmatikos*, relating to color, from χρῶμα, *chrōma*, color, from χρώζειν, *chrōzein*, to touch, color, from χροά, *chroa*, χροιά, *chroia*, skin). In music, a term applied to a series of notes at the interval of a semitone from each other. Such a series is produced by dividing the whole tones of the diatonic (q.v.) scale into semitones, so that with the two diatonic semitones, already in the natural scale, the octave is divided into twelve semitones. Ascending chromatic passages are formed by the whole tones of the diatonic scale being raised or elevated by a sharp or a natural, according to key, and descending passages by their being lowered by a flat or a natural, thus:



CHROMATICS. See COLOR.

CHRO'MATIN (from Gk. χρῶμα, *chrōma*, color). In biology, a network of fine strands or aggregations of substance that occurs in the nucleus of the cell during its different phases and has more avidity for staining agents than ordinary protoplasm. See CHROMOSOME; CELL.

CHROMAT'OPHORE (from Gk. χρῶμα, *chrōma*, color + φόρος, *phoros*, bearing, from φέρειν, *pherein*, to bear). A protoplasmic body in plants (see PLASTID), which contains or is capable of forming pigments. They are of three sorts, chloroplasts, chromoplasts, and leucoplasts (qq.v.).

CHRO'MATROPE (by haplology for **chromatotrope*, from Gk. χρῶμα, *chrōma*, color + τροπή, *tropē*, turn, from τρέπειν, *trepein*, to turn). An optical toy consisting of a revolving disk, on which are painted certain designs of various colors. These figures are so arranged that when the chromatrope is made to revolve rapidly, streams of beautiful, brilliant colors seem to flow either to or from the centre of motion, according as the disk is made to rotate in one direction or the opposite. The same principle is utilized in the *chromatrope slide*, employed in magic-lantern exhibitions. In this, two circular disks of glass are placed face to face, each with a design radiating from the centre, and painted with brilliant transparent colors. By a small pinion gearing in toothed wheels or endless bands, the disks are made to move in opposite directions in their own plane. The effect produced is a beautiful change of design and color.

CHRO'MITE (from Gk. χρῶμα, *chrōma*, color), or CHROMIC IRON ORE. The principal source of chromium. It is an iron-black to brownish-black ore containing the sesquioxides of chromium and aluminum, protoxide of iron, and some magnesia. Chromite is found in Norway, France, Siberia, and New Caledonia, and especially in Asia Minor. It is also found in various localities in the United States: near Baltimore, Md.; in Chester County, Pa.; and in a number of places in California. Thirty-five hundred and ninety-nine tons, valued at $53,985, were produced in the United States in 1890. This amount diminished until in 1896 there were produced only 786 tons, valued at $6667; since then none has been reported.

CHRO'MIUM (Neo-Lat., from Gk. χρῶμα, *chrōma*, color). A metallic element discovered by Vauquelin in 1797. It does not occur free, but is found in combination chiefly with iron as chromite, which is the principal ore of chromium, as crocoisite, a lead chromate, and as wolchonskoite, a native chrome ochre. Chromium is also a frequent constituent of meteoric iron, and the green color of emerald, serpentine, penninite, and other minerals, is due to this element. The metal is readily obtained from chromite by separating the iron and reducing the remaining chromic oxide with charcoal by heating in a lime crucible. It may also be prepared by the electrolysis of a solution of chromous chloride containing chromic chloride.

Chromium (symbol, Cr, atomic weight, 52.1) is a grayish-white powder consisting of small lustrous, very hard, brittle rhombohedral crystals which have a specific gravity of 5.9 to 6.8, and melt at a higher temperature than platinum. Owing to its high melting-point, the metal itself has no important uses, although when added in quantities of less than 1 per cent. to steel it yields an alloy called *chromium steel,* which has a fine texture, great hardness, tenacity, and elasticity. An alloy of chromium with aluminum has also been described. With oxygen chromium forms two basic oxides, which yield, respectively, chromous and chromic compounds, and an acid-forming oxide which yields chromates. Chromic oxide may be obtained by igniting the hydroxide or by heating a mixture of potassium bichromate and sulphur. It is a green pigment of great permanence that is known in commerce as *chrome green* and *ultramarine green.* The hydrated oxide, which is made by heating to dull redness 3 parts of boric acid and 1 part of potassium bichromate, is the pigment known as *emerald green, Guignet's green, Pennettier's green,* and *Veridian.* Of similar composition is the green pigment called *Arnaudon's green.*

Many of the chromates have considerable commercial value, especially those of potassium, sodium, and ammonium. Among the bichromates, that of potassium is the most important, as it is used in the preparation of all other chromium salts. Potassium bichromate is prepared from chromite, the ore being, for this purpose, roasted, finely ground, and mixed with half its weight of potassium carbonate and twice its weight of lime; the mixture is heated to bright redness with an oxidizing flame in a reverberatory furnace, and, on cooling, the resulting mass is treated with hot water; to the solution thus obtained potassium sulphate is added for the purpose of precipitating the lime as sulphate, while the potassium chromate produced remains dissolved; finally, dilute sulphuric acid is added in order to convert the chromate into bichromate. Potassium bichromate crystallizes in the form of bright-red prisms. It is used for the preparation of chrome pigments for the production of various colors in calico-printing and dyeing; in the manufacture of safety matches; as a bleaching agent for tallow, palm oil, etc., with sulphuric acid; for the oxidation of anthracene to alizarin; in tanning leather; and in consequence of its property of rendering gelatin insoluble when mixed with that substance and exposed to light, it finds extensive application in photogelatin processes. *Lead chromate* is the bright-yellow precipitate obtained when a solution of a lead salt is added to potassium bichromate: it is used as a pigment under the name of *chrome yellow.*

CHRO'MOLITH'OGRAPH. See LITHOGRAPHY.

CHRO'MOPLAST (from χρῶμα, *chrōma,* color + πλαστός, *plastos,* formed, from πλάσσειν, *plassein,* to form). A protoplasmic body in plants which contains a pigment other than green, chiefly yellow or red. It is abundant in fruits and flower-leaves. In shape the chromoplasts are rounded, fusiform, angular, or irregular, their form being often determined by the pigment they contain. Sometimes the pigment exists in minute droplets in the protoplasm, but more frequently it is crystalline; or both forms may be present together. The crystals vary from needle-like or rod-like to tabular. The slender crystals are sometimes curved and often occur in fascicles. Chromoplasts are derived from similar bodies by division. A plastid (q.v.), the primary undifferentiated body, may develop directly into a chromoplast, or it may be for a time a leucoplast (q.v.), or a chloroplast (q.v.), and only later produce the red or yellow pigment that characterizes a chromoplast. If the chromoplasts have any special function it is not known. In a general way the color they impart may be useful, but the color is frequently due to other causes. See CELL; COLOR IN PLANTS.

CHRO'MOSOME (from Gk. χρῶμα, *chrōma,* color + σῶμα, *sōma,* body). The name given to the loops or other aggregations of chromatin which collect in indirect cell-division about the axis of the spindle and split into halves. The two halves move toward opposite poles of the spindle, where they aggregate and unite into the form of the chromatin of a new nucleus. See CHROMATIN; CELL; EMBRYOLOGY.

CHRO'MOTYPE, or **CHRO'MATYPE** (from Gk. χρῶμα, *chrōma,* color + τύπος, *typos,* type). A photographic process dependent upon the sensitiveness to light of certain chromium salts, especially the bichromates of the alkalies. The chromotype has been superseded by the photogelatin processes, and is at present hardly ever used. (See AUTOTYPE.) The name is also applied to colored prints produced by 'chromatic printing.'

CHRON'ICLE (from *chronic,* Fr. *chronique,* It. *cronico,* Lat. *chronicus,* from Gk. χρονικός, *chronikos,* relating to time, from χρόνος, *chronos,* time). A species of historical record in which events are treated in the order of time. A chronicle is understood to differ from annals in being more connected and full, the latter merely recording individual occurrences under the successive years or other dates. A great many of the older histories were called chronicles, such as the *Saxon Chronicle,* Holinshed's *Chronicle.*

CHRONICLE OF PA'ROS. An inscription discovered on the island of Paros in 1627, containing memoranda of much historic interest. It mentions various facts, especially the artistic ones, in Greek history, from the legendary reign of Cecrops, King of Athens, in B.C. 1582. The list originally extended to the archonship of Diogenetus, in B.C. 264; but the conclusion, from the year B.C. 355, is now lost. As a political and military history the chronicle is faulty. It is preserved at Oxford, among the Arundel marbles.

CHRONICLE OF THE KINGS OF ENGLAND, FROM THE TIME OF THE ROMANS' GOVERNMENT UNTO THE DEATH OF KING JAMES. An historical work by Sir Richard Baker, published in 1643, dedicated to Charles, Prince of Wales, containing a laudatory preface by Sir Henry Wotton (q.v.). It was a very popular work for the century after its publication. It ran through seven editions before the close of 1684, and was translated into Dutch in 1649. In 1730 it was extended up to the reign of George II. It is, however, full of inaccuracies, and was sharply criticised in 1672 by Thomas Blount, in a pamphlet published in Oxford. It was a favorite with Addison's Sir Roger de Coverley.

CHRONICLES (Heb. *Dirrai hay-yamim,* events of the days, Gk. Παραλειπόμενα, *Paraleipomena,* omitted, sc. βιβλία, *biblia,* books). The name of two of the books of the Old Testament, which in the Hebrew canon form but one book, entitled "Book of Events of the Times." This appears to have been a designation commonly applied to special histories—such as, for example, "Events of the Times of King David," or the like. The Greek translators divided the long Hebrew book into two, and adopted the title "Things Omitted"—that is, not recorded in the other historical books. Jerome suggested the title "Chronicon," whence comes the English name. The Book of Chronicles begins with Adam and ends abruptly in the middle of Cyrus's decree of restoration. The continuation of the narrative is found in the Book of Ezra, which completes the fragment of the decree of the Persian King. Chronicles, in fact, formed originally one work with Ezra and Nehemiah, displaying throughout the peculiarities of a single author. The apparent separation of Ezra and Nehemiah from Chronicles proper is due to the insertion in the former of extracts from the memoirs of Ezra and Nehemiah and from other earlier documents. Of the authorship of Chronicles nothing is known except what can be determined by internal evidence. The language, and more particularly the syntax, implies that the book is one of the latest of the Old Testament. It is evident that the author lived a considerable time after Ezra, and stood entirely under the influence of the religious institutions of the new theocracy. This point of view determined the nature of his interest in the early history of his people. The true importance of Hebrew history centres for him in the fact that this petty nation was the people of Jehovah. The tragic interest which distinguishes the annals of Israel from the forgotten history of Moab or Damascus lies wholly in that long contest which finally vindicated the reality of spiritual things and the supremacy of Jehovah's purpose by the political ruin of the nation which was the faithless depositary of these sacred truths. After the captivity it was impossible to write the history of Israel's fortunes otherwise than in a spirit of religious pragmatism. But within the limits of the religious conception of the plan and purpose of the Hebrew history, more than one point of view might be taken. The Book of Kings looks upon history in the spirit of the prophets. But before the Chronicler wrote, prophecy had become extinct. The Jerusalem of Ezra was organized no longer as a nation, but as a municipality and a church. The centre of religious life was no longer the prophetic word, but the ordinances of the Pentateuch and the liturgical service of the sanctuary. The religious vocation of Israel was no longer national, but ecclesiastical and municipal; and the historical continuity of the nation was vividly realized only within the walls of Jerusalem and the courts of the Temple, in the solemn assembly and stately ceremonial of a feast-day. These influences naturally operated most strongly on those who were officially attached to the sanctuary. To a Levite, even more than to other Jews, the history of Israel meant above all things the history of Jerusalem, of the Temple, and of the Temple ordinances. The author of Chronicles betrays in every page his essentially Levitical habit of mind. To such a mind, in the fallen condition of the Jews as a political nation, there seemed to be room for a new history, which should confine itself to matters still interesting to the theocracy of Zion, keeping Jerusalem and the Temple in the foreground, and developing the divine significance of the history in its causes and results, not so much with reference to the prophetic word as to the fixed legislation of the Pentateuch, so that the whole narrative might be made to teach that the glory of Israel lies in the observance of the divine law and ritual. For the sake of systematic completeness, the author of the Chronicles begins with Adam; but he had nothing to add to the Pentateuch, and the period from Moses to David contained little that served his purpose. He therefore contracted the early history into a series of genealogies, which were by no means the least interesting part of his work at a time when every Israelite was concerned to prove the purity of his Hebrew descent. From the death of Saul, the history becomes fuller, and runs parallel with the books of Samuel and Kings. The limitations of the author's interest in past times appear in the omission, among other particulars, of David's reign in Hebron; of the disorders in his family and the revolt of Absalom; of the circumstances of Solomon's accession; and of many details as to the wisdom and splendor of that sovereign, as well as of his fall into idolatry. In the latter history, the ten tribes are quite neglected, and political affairs in Judah receive attention, not in proportion to their intrinsic importance, but according as they serve to exemplify God's help to the obedient and His chastisement of the rebellious. That the author is always unwilling to speak of the misfortunes of good rulers is not to be ascribed to a desire to suppress the truth, but shows that the book was throughout composed not in purely historic interest, but with a view to inculcate a practical lesson. The more important additions which the Chronicler makes to the old narrative consist partly of full details of points connected with the history of the sanctuary and the great feasts, or the archæology of the Levitical ministry, and partly of narratives of victories and defeats, of sins and punishments, of obedience and its reward, which could be made to point a plain religious lesson in favor of faithful observance of the law. The minor variations of Chronicles from the books of Samuel and Kings are analogous to the larger additions and omissions, so that the whole work has a consistent and well-marked character, presenting the history in quite a different perspective from that of the old narrative. It is still possible to determine within certain limits the nature of the sources which were employed by the author. He had before him the canonical books of Samuel and Kings, from which he made excerpts; but, in addition to these, had at his disposal 'Midrashic' compilations, in which the past history was no longer told in sober fashion, but, embellished with more or less fanciful details, was intended as a means of illustrating religious ideas and of teaching moral lessons. He mentions such a Midrash of the Book of Kings (II. Chron. xxiv. 27), and also specifically refers to a Midrash of the prophet Iddo (II. Chron. xiii. 22), which appears to have been a separate work either attributed to Iddo or in which the prophet plays a prominent part. There were probably other works of a similar character in existence, and it is important to note that these compilations were based upon the annals of the kings of Israel and Judah respectively, which also form the sources underlying the canonical books of Kings. The variations of the Chronicles from the latter, however, are due in most instances to his religious pragmatism. Everything is done to emphasize the ancient importance of the Levites, who are introduced at points and on occasions which are most inappropriate. He is also fond of high figures in enumerating sums and armies. The speeches introduced by him and put into the mouths of prominent personages also reflect entirely the Chronicler's peculiar point of view. Taking all this together, it is claimed by many that the historical value of Chronicles, where it varies from the books of Samuel and Kings, is small, and, except in some details, which have chiefly an interest as representing perhaps a more or less widespread tradition, there is a reluctance among modern critical scholars to depend upon it in the study of Hebrew history.

Bibliography. See the commentaries of Bertheau, Kittel, Keil, Benzinger, etc., and introductions to the Old Testament of Driver, Wildeboer, Kuenen, Bleek-Wellhausen, König, Kautzsch, etc.

CHRONICLES OF THE CANONGATE. A series of tales by Sir Walter Scott. The first set, including *The Highland Widow*, *The Surgeon's Daughter*, and *Two Drovers*, was published in 1827; and the second, containing *The Fair Maid of Perth*, appeared in the ensuing year. They are supposed to be told by a certain Mr. Chrystal Croftangry, who, he informs us, got them from a Mrs. Baliol. See Canongate, The.

CHRONICLES OF THE SCHÖNBERG-COTTA (shēn'bĕrk kōt'tȧ) **FAMILY.** A novel by Miss Rundell (later Mrs. Andrew Charles), published anonymously in London in 1863, and in New York in the following year. It is as 'author' of this work that Mrs. Charles signed her later works.

CHRON'OGRAM (from Gk. χρόνος, *chronos*, time + γράμμα, *gramma*, letter, from γράφειν, *graphein*, to write), or Chronograph. A whimsical device of the later Romans, resuscitated during the Renaissance Period, by which a date is given by selecting certain letters among those which form an inscription, and printing them larger than the others. The principle will be understood from the following chronogram, made from the name of George Villiers, first Duke of Buckingham:

georgIVs. DVX. bVCkIngaMIæ.

The date MDCXVVVIII. (1628) is that of the year in which the duke was murdered by Felton, at Portsmouth. Consult Hilton, *Chronograms* (1882).

CHRON'OGRAPH (Lat. *chronographus*, from Gk. χρονογράφος, *chronographos*, from χρόνος, *chronos*, time + γράφειν, *graphein*, to write). A term applied to instruments measuring very short intervals of time as well as to instruments recording such measures. Chronograph watches, or pocket chronographs, will measure intervals of time down to fifths of a second, for use at horse races and other occasions where a seconds watch is not exactly suited. They have an ordinary quick-train lever movement, carrying hands which move over a dial. One of these is a seconds hand, very peculiarly made. The seconds hand is double, consisting of two distinct hands, one superposed on the other. As the double seconds hand revolves, it is possible to stop one of its component halves by touching a spring at the side of the case. A record having thus been made of the exact fraction of a second marked by the position of the stopped hand, another pressure of the spring makes it fly back to its former position on the moving component. The instrument is then ready for another observation. There are numerous modifications of this form of instrument; they are sometimes called stop-watches, or split-second fly-back watches.

The astronomical chronograph is used to record permanently the exact instant of time when certain astronomical observations are made. Such a time record is of course extremely important in almost all forms of astronomical work. As usually constructed, the instrument consists of a metal cylinder or drum, upon which is wound a sheet of paper to receive the record. The drum is connected with a clockwork apparatus which makes it turn on its axis once each minute. At the same time, a fountain pen, or some other form of marking instrument, is pressed against the paper so that a line is traced around the drum as it turns. The pen is attached to an electro-magnet, which in turn is moved very slowly by the clockwork along the axis of the drum. The result of these motions of the drum and pen is to trace a continuous spiral line on the paper around the drum. The electro-magnet is connected with the astronomer's standard clock by wires, and once every second an electric signal is sent automatically by the clock into the magnet. This results in a short interruption or break in the line traced by the pen. Such a break, then, marks the beginning of each second on the chronographic time-record. When the astronomer wishes to record the exact time of an observation, he has but to tap a telegraphic key held in his hand, and a signal similar to the clock signals will reach the chronographic electro-magnet. The result is a break in the record line, similar to those due to the clock. It is then merely necessary to measure the position of the observer's break with reference to the clock breaks, to fix the exact fraction of a second corresponding to the observation. There is little difficulty in thus measuring a chronographic record to the twentieth part of a second of time. See Chronoscope.

CHRONOLOGY (Fr. *chronologie*, from Lat. *chronologia*, from Gk. χρονολογία, *chronologia*, from χρόνος, *chronos*, time + λόγος, *logos*, account). The branch of science which treats of time as measured, computed, and recorded. Its object is to establish some method of defining time, to compute the intervals between important historical events, and to fix the dates of events uniformly with reference to some chosen point in the history of the world.

The familiar units of time are the year, the month, and the day. These are astronomical, and are determined by recurring celestial phenomena. The epoch universally employed to-day, before which and after which events are said to have occurred, is the birth of Christ. The years before Christ are marked B.C. and those after A.D. (Anno Domini). The astronomical units, however, have not always been employed, and the epoch or reckoning point differed among various peoples. Thus in early days, such vague periods as generations, or reigns of kings, were assumed as units; but finally, through the suggestion, it is said, of the philosopher Eratosthenes, who was in charge of the library in Alexandria, in the Third Century B.C., the year was introduced as the unit of time. The difference in epochs led to various suggestions which were gradually discarded with the spread of civilization and the closer intercourse of men. The systems used by the Greeks and Romans were most important in antiquity. The Greeks calculated by Olympiads, beginning their era from the years of the victory of Corœbus in the Olympic games, which corresponds to the year B.C. 776. The Romans began their era from the founding of the city, generally accepted as the year B.C. 753.

The study of the astronomical units and the measurement of time belong to the department of mathematical astronomy. The historian employs chronology to enable him to transfer events in history located in time according to various eras to his own system, the Christian Era.

The method of reckoning time by Olympiads was used by the historian Timæus about B.C. 240, and was generally adopted by other Greek historians. The Olympiads were determined by the Olympic games, which were held every four years in the summer-time. The Olympic year therefore begins in the middle of our year, and the first and latter half of our year belong to different Olympiads. Thus, Socrates was put to death in the first year of the 95th Olympiad. The reckoning is as follows: 94 × 4 = 376; this subtracted from 776 gives 400, but his death took place in the eleventh month, hence 1 should be subtracted, so that B.C. 399 is the year of his death with reference to the Christian Era. If the date falls after Christ, 776 must be subtracted from the Olympic year. The calculation by Olympiads lasted down to the Fifth Century of our era.

The date of the foundation of Rome is given by Fabius Pictor in a year corresponding to B.C. 747, by Polybius in B.C. 750, by M. Porcius Cato in B.C. 751, by Verrius Flaccus in B.C. 752, and by Terentius Varro in B.C. 753. Among Roman writers Livy follows Cato and at times Fabius Pictor. Cicero and Pliny follow Varro. The Varronian date is generally accepted by modern writers. In changing from the Roman to the Christian Era, subtract the years of Rome from 754 if the date is before Christ, but if the date is after Christ subtract 754 from the year of Rome.

The Greek and Roman methods continued in use long after Christ. Constantine the Great is said to have introduced the system known as indiction. This was a cycle of fifteen years which were denoted Indiction 1, Indiction 2, up to Indiction 15, when the series began anew. There are four kinds of indictions, which owe their difference merely to the fact that they are reckoned from different days. Thus the Indiction of Constantinople began with September 1, A.D. 312; the Imperial, on September 24, A.D. 312; the Roman or Pontifical, on December 25, A.D. 312, or January 1, A.D. 313; that of the Parliament of Paris, in October. As A.D. 1 equals Indiction 4, add 3 to the year of the Christian Era and divide by 15, and the remainder will be the number of the Indiction. If there is no remainder the Indiction is 15.

The year of the Christian Era, as now arranged, like the Julian year, established by Julius Cæsar, extends from January 1 to December 31. The Christian Era was first used by Dionysius Exigius in A.D. 533. He regarded the birth of Christ as taking place in the year of Rome 754, although early Christians placed it in 750. The Dionysian year, however, dated from the Annunciation, March 25 of the preceding year. The commencement of the year was assigned to different days in different places. Thus in England down to the Conquest it was counted from Christmas or from March 25; from the Conquest to 1155 from January 1, from 1155 to 1451 from March 25. In France the beginning of the year varied in different dioceses, being either Christmas or March 25, until 1564, when January 1 was selected. In the middle of the Sixteenth Century January 1 was determined upon in Germany, Italy, Spain, and Portugal. The era of the creation of the world is obtained from the Old Testament, but varies in the different texts. The Hebrew version reckons 1656 years from creation to the flood and 4000 years from creation to the birth of Christ. The Samaritan makes the latter interval much longer, though it counts from the creation to the flood only 1307 years. The Septuagint version removes the creation of the world to 6000 years before Christ and 2250 years before the flood. It is now, however, universally admitted that the creation of the world cannot be placed at so recent a date as B.C. 6000, and the modern understanding of the first chapter of Genesis leaves the period of the creation quite indefinite, and one scheme of interpretation stretches out the days of creation into periods of indefinite length. Des Vignoles, a writer on the chronology of sacred history, collected more than two hundred different estimates of the era of the creation, the shortest being 3483 and the longest 6984 years. If such or such a date from the creation means anything, it is probably to be read by the date fixed by Archbishop Usher, which was B.C. 4004.

Various other eras are worthy of mention. The era of Constantinople dates the creation of the world 5508 years and 4 months before the beginning of our era, the civil years beginning September 1, the ecclesiastical March 21 or April 1. The era of Alexandria used by the Christians of that city placed the creation of Adam 5500 years before the birth of Christ. We must allow three years for the date assigned by the early Christians to the Incarnation. Hence we may change dates of this era to our own by subtracting 5502. When Diocletian became Emperor, ten years were omitted, and after that date, which is 5786 according to the Alexandrian Era, we must subtract 5492. The mundane era of Antioch, used by the Christians of Syria, is the same as the Alexandrians after the time of Diocletian. The Julian period should be mentioned here. It was invented by Joseph Justus Scaliger in 1582 to obviate the inconvenience of counting in two ways, before and after Christ. He estimated a period of 7980 Julian years, and the first year of the Christian Era corresponded to 4714 of his era. The era of Nabonassar, which obtains its name from the founder of the Kingdom of Babylon, was used by astronomers. Its date is February 26, B.C. 747, which was calculated from records of Ptolemy, based on celestial phenomena. The Macedonian era, known also as that of the Seleucidæ, began on September 1 of the Julian year, 312 years before our era. The era of Spain, used in

Spain, Portugal, Africa, and parts of France, dated from the conquest of Spain by Augustus in B.C. 39. As the era of Spain began January 1, 38, subtract 38 from the number of the year to change from the Spanish era to the Christian. The following table gives the precise dates of the beginning of the eras just mentioned and of others of less importance:

		B.C.
Grecian, Mundane	September 1,	5598
Constantinople, Civil	September 1,	5508
Alexandrian	August 29,	5502
Aatioch, Mundane	September 1,	5492
Julian Period	January 1,	4713
Mundane, Usher	October	4004
Mundane, Jewish	October	3761
Abraham	October 1,	2015
Olympiads	July 1,	776
Rome, foundation of	April 24,	753
Nabonassar	February 26,	747
Metonic Cycle	July 15,	432
Macedonian, or Grecian	September 1,	312
Tyrian	October 19,	126
Sidonian	October	110
Cæsarian, of Antioch	September 1,	48
Julian Year	January 1,	45
Spanish Era	January 1,	38
Actian	January 1,	30
Augustan	February 14,	27

Various other systems of chronology may be found mentioned under the names of the nations by whom they were employed. See also CALENDAR; YEAR; MONTH; DAY; CYCLE; etc.

CHRONOM'ETER (Fr. *chronomètre*, It. *cronometro*, from Gk. χρόνος, *chronos*, time + μέτρον, *metron*, measure). The name given principally to such time-keepers as are used for determining the longitude at sea. The mechanism is essentially the same as that of a common watch, only the size is generally greater; the balance-wheel is compensated for variations of temperature; and the whole instrument is hung in a frame of balancing rings called gimbals. These prevent the ship's motion from influencing the chronometer's rate too much.

CHRON'ONHOT'ONTHOL'OGOS (fantastically coined word). A burlesque by Henry Carey, produced February 22, 1734, at the Haymarket, and described as "the most tragical tragedy ever yet tragedized." It was partly suggested by Fielding's *Tom Thumb*. The title character is the Monarch of Queerummania (q.v.), and has become the type of all braggarts. The play was published in the quarto edition of his dramatic works (London, 1743).

CHRON'OSCOPE (Fr. *chronoscope*, It. *cronoscopo*, from Gk. χρόνος, *chronos*, time + σκοπός, *skopos*, watcher, from σκοπεῖν, *skopein*, to watch). An instrument for measuring accurately small intervals of time, used in psychology, physiology, and in many departments of experimental and applied physics. The first attempt to measure a very small period of time was made by Sir Charles Wheatstone in 1834, when he endeavored to ascertain the duration of the electric spark. This was accomplished by means of a revolving mirror; and as this apparatus was the first and simplest of a number of similar instruments, it may be described at some length. On a horizontal axis capable of being revolved at high speed, a mirror was fixed. The rays issuing from a luminous point, such as a small flame, were reflected from the mirror when at rest, and reached the eye of the observer. If the mirror is slowly revolved, the image of the luminous point will be either raised or lowered, and if the speed of rotation is increased, instead of a succession of images there will be seen a continuous streak or band of light. If the given source of light be supplanted by an electric spark, and the mirror set in rotation, as long as the duration of the spark is less than is required by the mirror to reflect the rays across the field in the form of a band, then the spark will appear as a point; but, increasing the speed of the mirror, a stage will be reached where the image will be produced in the form of a bright streak. The time of the spark can then be calculated in the following way: First the velocity of the mirror is observed; then, suppose that the image of the spark extends over what is equivalent to one-half a degree of arc. As the movement of the reflected ray is, from the laws of reflection, twice that of the reflecting mirror, it would follow that when the mirror was revolving at a velocity of 800 revolutions per second, the time consumed by the mirror in causing the spark to appear as a streak of light would be $\frac{1}{800} \times \frac{1}{2} \times \frac{1}{360} \times \frac{1}{2}$ or $\frac{1}{1152000}$ of a second.

Wheatstone also employed this apparatus to study the time consumed by an electric current in passing over a conductor, using for this purpose the sparks furnished at different lengths of the conductor, and measuring the difference in time between their occurrences. A rotating mirror was also used by Feddersen in his researches on the electric spark, and again by Rood, the former employing a concave mirror, while the latter used a plane mirror in connection with a system of lenses.

To Wheatstone is due another form of chronoscope, which was used for measuring the velocity of a projectile from the time it left a cannon until any desired point was reached. This apparatus in its essence consisted of a clock which was set in motion and stopped by the armature of an electro-magnet. Across the muzzle of the gun a wire was placed which was broken at the exit of the projectile and the circuit opened, thus releasing the armature of the electro-magnet and setting in motion the clockwork. When the shot reached the required distance the circuit was closed, and the clock stopped in a similar fashion. Wheatstone did not claim a greater accuracy for this instrument than to $\frac{1}{50}$ of a second, but improvements by Hipp, who, keeping the clockwork in motion, used the magnets only to throw the indicating part of the apparatus into gear with the movement, made the instrument more serviceable.

W. Siemens used a rapidly rotating cylinder, on a paper covering of which sparks from a circuit containing Leyden jars made the record-marks. The introduction of a seconds pendulum into the circuit gave a record of the time by causing spark-punctures at regular intervals, and the desired times could be found by comparing the distances. With this apparatus the velocity of a projectile while in the bore of the cannon could be measured, it being only necessary to insert insulated conductors at different points where the circuit could be made or broken by the traveling shot. Siemens also used this form of chronoscope, or chronograph, to measure the velocity of the electric current. Helmholtz improved the instrument by providing mechanism to give a constantly increasing velocity, making his measurement when the desired rate of speed was reached, the regulation being effected by the action of centrifugal force. This form of instrument has been employed extensively in physiological work, and there are numerous modifications now in use.

Tuning-forks (see TUNING-FORK; CHRONOGRAPH) are also employed extensively for measuring small intervals of time, as they furnish an extremely accurate means for making such determinations. A device used by Pouillet was a circular disk of glass on which was a smaller circle of tinfoil and a narrow strip extending to the circumference. This was used to complete an electric circuit with a galvanometer, the principle involved being that with a continuous current for an extremely brief space of time, the strength of the current and consequently the deflection of the galvanometer is proportional to the time it is flowing.

In the Nobel chronoscope, extensively used in artillery tests, there are eight bronze rotating disks, each covered with a strip of blackened paper, on which a record is made by means of an electric spark. This instrument is used to measure both internal and external velocities, as is also the Schultz chronograph, which employs a tuning fork and electro-magnets. The velocity at different distances is obtained by having the circuit opened or closed by means of the wires of a screen through which the projectile passes. In an instrument for a like purpose, the invention of Crehore and Squier, the record is obtained by means of a beam of polarized light falling on a rapidly revolving photographic plate. In this instrument the plane of polarization is shifted by the action of a magnetic field produced on closing the circuit. When a current flows the beam is rotated so that it does not affect the plate, leaving a blank in the path traced by the beam. A tuning-fork is used to keep track of the time, and by means of the wavy line traced by it the time between interrupted points on the tracing of the first beam may be ascertained.

The Boulengé chronograph is now much used in artillery tests of velocity, and depends upon the distance a body falls in a given interval of time. It will be found discussed and illustrated in the article on BALLISTICS.

The chronoscope and chronograph, terms which are more or less interchangeable, are also constructed in numerous other forms, in some of which, for example, the principle of the pendulum is employed, and one is now able to measure time with an extreme degree of accuracy.

The instruments of Fizeau and Foucault to measure the velocity of light must be considered among the early forms of those instruments. In the former a wheel with projecting teeth was used to interrupt a beam of light which was sent to a distant mirror and back. The speed of the mirror was so adjusted that the beam of light which is transmitted through the space between two teeth is received after reflection in the next open space, and the velocity determined by ascertaining the distance traveled by the beam and the time consumed in the fraction of a revolution of the toothed wheel. Foucault used a revolving mirror, as did also Michelson, whose determinations are considered most reliable and accurate. Consult Müller-Pouillet, *Lehrbuch der Physik* (Brunswick, 1886). See BALLISTICS; CHRONOGRAPH; VELOCITY OF LIGHT.

CHRUDIM, kro͞o′dēm. A town of Bohemia, Austria, situated on the river Chrudimka, 74 miles by rail from Prague (Map: Austria, E 2). It has a number of churches, among them one dating from the Thirteenth Century, and numerous industrial establishments. Population, in 1890, 12,128; in 1900, 13,017.

CHRYSAL (krĭs′*al*), OR THE ADVENTURES OF A GUINEA. A novel by Charles Johnstone, published in four volumes, in London (1760-65). Before the last two volumes appeared, the first two ran through several editions. An excellent edition was brought out in London in 1821, in three volumes. The book gives an account of the lives and characters of those into whose hands Chrysal (the gold piece) passes. It contains a keenly satirical estimate of the author's contemporaries under this allegorical disguise. Consult: Scott, *Miscellanies* (Edinburgh, 1861-62); also Davis, *Olio of Bibliographical and Literary Anecdotes* (London, 1814).

CHRYSALDE, krē′zäld′. Friend and confidant of Arnolphe, in Molière's *L'Ecole des femmes* (q.v.). He closes the piece with the optimistic line, "Give thanks to God, who does all for the best."

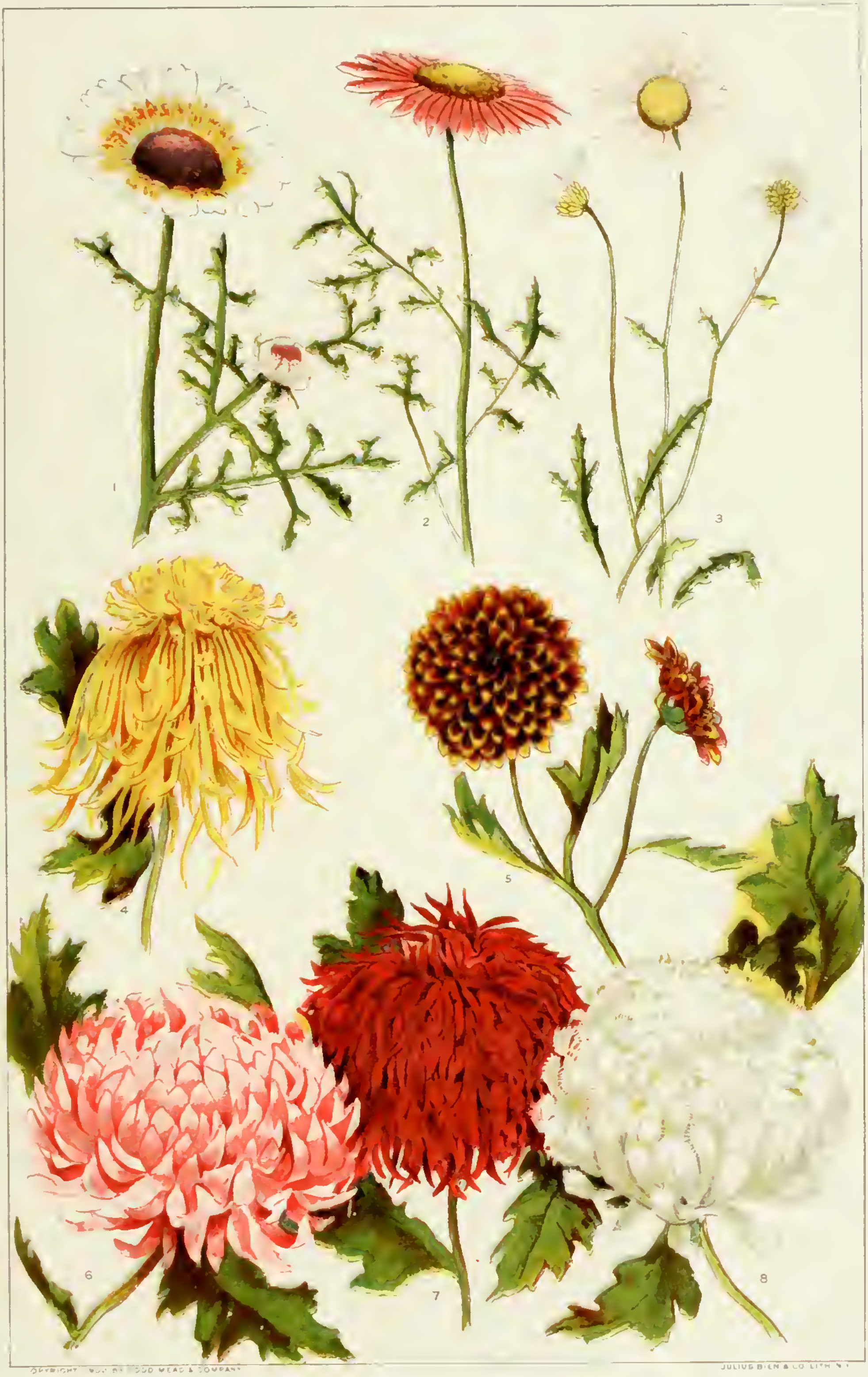
CHRYSALE, krē′zäl′. The henpecked husband of Philaminte in Molière's *Les femmes savantes*. He is the type of a *bon bourgeois*, and, though under the domination of his *précieuse* wife, is inspired by the love he bears his daughter Henriette to assert his authority, and save her from the base Trissotin (q.v.).

CHRYSALIS, krĭs′ȧ-lĭs. See BUTTERFLIES AND MOTHS.

CHRYSANDER, krē′sän-dẽr, FRIEDRICH (1826—). A German writer on the science of music. He was born in Lübtheen, Mecklenburg-Schwerin, and studied philosophy in Rostock, but later gave up his time entirely to musical study. He has contributed extensively to the literature of this subject, and is especially well known as the editor of Handel's works, his edition having been the first to be prepared from the original sources. The edition was really published by Chrysander as a private enterprise, more particularly after the death of his collaborator, Gervinus, in 1871, when, equipped with a simple hand-press and assisted by only one printer and one engraver of music, he continued the publication of the work at his own expense, in this way completing all but three volumes. Foremost among the striking improvements introduced by Chrysander into this famous edition are the following: A new German translation of the original English text, emphasizing the relation between word and tone; the concentration of the dramatic element; the restoration of the arias; and, most important of all, the restoration of the original Handelian orchestra.

CHRYSANTHEMUM (Lat., from Gk. χρυσάνθεμον, *chrysanthemon*, from χρυσός, *chrysos*, gold + ἄνθεμον, *anthemon*, flower). A genus of plants belonging to the natural order Compositæ. The species are natives of northern Europe, the Canary Islands, East Africa, and the mountain and boreal region of Asia. About one hundred and fifty species have been described. The plants of this genus are characterized by heterogamous heads, with ligulate ray flowers in one row and mostly pistillate and sterile, perfect disk florets, and naked flat or hemispherical receptacles. The

CHRYSANTHEMUMS



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1 SINGLE ANNUAL CHRYSANTHEMUM CHRYSANTHEMUM CARINATUM
2 PYRETHRUM — C. COCCINEUM
3 OXEYE DAISY WHITE WEED — C. LEUCANTHEMUM
4 IRREGULAR CHRYSANTHEMUM
5 POMPON CHRYSANTHEMUM
6 JAPANESE CHRYSANTHEMUM INCURVED TYPE
7 " " RECURVED TYPE
8 OSTRICH PLUME

plants are free bloomers both in the wild and cultivated state. The heads are solitary on long peduncles, or corymbose. Usually the rays spread wide open and are conspicuously showy, white, yellow, or rose-purplish in tint, while the disk flowers are for the most part yellow.

The Chinese and Japanese species, *Chrysanthemum Indicum* and *Chrysanthemum Sinense*, are the prolific parents of the many forms now in cultivation in Europe and the United States. The diversity of color, shape, and size which has been developed in these flowers is remarkable. They range all the way from the pompon, or button form, to the huge head that measures nearly eight inches in diameter, and with ray florets three or four inches in length. In shape they are quilled or plain, double, semi-double, and single, with florets erect or reflexed. They are of nearly all colors and shades. The species are generally wanting in fragrance. The different varieties are obtained from seedlings. Chrysanthemums are generally grown by florists from cuttings and by amateurs in the garden by division. The plant succeeds in either clay or sand, providing the soil is rich and good cultivation is given. Disbudding is practiced to secure large well-formed flowers.

Chrysanthemum leucanthemum, or oxeye daisy, is a common weed in pastures throughout the Atlantic States. Another species, *Chrysanthemum segetum*, is the corn-marigold of Europe. *Chrysanthemum frutescens*, known in France as marguerite, and widely cultivated in that country for ornamental purposes, has found its way into other lands, and is grown either in pot culture or, where the climate will allow, in the open air. Consult: "Chrysanthemum," in *Cornell University Agri. Exp. Sta. Bulletins* 112, 136, 147 (Ithaca, 1896, 1897, 1898); Scott, *The Show Chrysanthemum and Its Cultivation* (London, 1897).

CHRYSAOR, krī-sā'ôr *or* krĭs'ȧ-ôr (Lat., from Gk. Χρυσάωρ). (1) The son of Poseidon and Medusa, in Greek legend. He sprang from his mother's head when she was decapitated by Perseus. (2) The name of Artegal's sword in Spenser's *Faerie Queen*.

CHRYSAROBIN, krĭs'ȧ-rō'bĭn (Neo-Lat. *chrysarobinum*, from Gk. χρυσός, *chrysos*, gold + E.Ind. *aroba*, bark of leguminous trees). A yellow, odorless and tasteless crystalline powder, employed in the form of an ointment in the treatment of sealing skin diseases, particularly psoriasis. It is derived from Goa powder, a substance found in the wood of the Brazilian tree *Andira araroba*. Its chemical composition is $C_{30}H_{26}O_7$. It is almost insoluble in water, and slightly soluble in alcohol, but dissolves freely in ether, benzene, and chloroform.

CHRYSE CHORA, krī'sē kō'rȧ (Gk. Χρυσῆ Χώρα, Golden Land). A name given by the ancients to a part of India, comprising the present Burma and the northern part of Pegu. Compare the Sanskrit *Suvarna-bhūmī*.

CHRYSEIS, krī-sē'ĭs. In the *Iliad*, Astynome, the daughter of Chryses, priest of Apollo at Chryse. She fell to the share of Agamemnon in the distribution of spoils during the Trojan War, and the ransom offered by her father was harshly refused by Agamemnon. Apollo, to punish the slight to his priest, sent a pestilence on the Greek camp, which was averted only by the return of Chryseis to her father.

CHRYSELEPHANTINE, krĭs'ĕl-ē-făn'tĭn (from Gk. χρυσελεφάντινος, *chryselephantinos*, of gold and ivory, from χρυσός, *chrysos*, gold + ἐλεφάντινος, *elephantinos*, made of ivory, from ἐλέφας, *elephas*, ivory, elephant). The art which prevailed among the Greeks of covering their statues with ivory and gold. The body of these figures was usually of wood over which a thin plating of ivory was fastened, and certain portions of the garments were made of gold. The hair, also, was of gold. These garments and the hair were usually chased. (See CHASING.) The modeled body of these statues belonged to the art of sculpture, while the chasing and ornamentation of the draperies and hair was called toreutic art. The statues were mainly of religious character and used for the ornamentation of temples. Winckelmann has calculated that about 100 statues of this kind are mentioned by the ancients. The colossal works executed by Phidias in Athens, in the time of Pericles, are the most famous of this class, the greatest being the Pallas of the Parthenon. It was 26 cubits high, and represented the goddess in armor, covered with a long robe. The famous Olympian Jupiter of Phidias, executed in the same materials, was also a world-wide wonder.

CHRYSES, krī'sēz. A priest of Apollo at Chryse, and father of Chryseis.

CHRYSIPPUS, krī-sĭp'pŭs (Lat., from Gk. Χρύσιππος) (c.280-207 B.C.). An eminent Stoic philosopher of Soli in Cilicia. He came to Athens when still a youth, and eagerly devoted himself to philosophical pursuits. His principal master was Cleanthes, the successor of Zeno, although he is said to have also studied under the academic teachers, Arcesilaus and Lacydes, and learned from them what were the objections urged by skeptics against the doctrines of the Stoics. He possessed an eager and facile mind, and enjoyed the reputation of being the keenest disputant of his time; yet his discourses were clever and subtle rather than seriously argumentative. His confidence in his own abilities was so great that, according to tradition, he told Cleanthes he desired to know only the principles of his system, the arguments he would find for himself; it was also his common practice to take at different times opposite sides of the same question, so that he furnished his opponents with the means of convicting him of inconsistency. Carneades (q.v.), his chief adversary, especially availed himself of this opportunity. In philosophy he was an expounder, not an originator. His literary industry was great. He is said to have written no fewer than 500 lines each day, and Diogenes Laërtius speaks of over 705 books by him. These were in the fields of philosophy proper, logic, physics, ethics, grammar, and interpretation of the poets; only fragments remain in the works of Plutarch, Ælian, Cicero, Seneca, and Aulus Gellius. These were edited by Petersen, 1827; Ritter and Preller (Gotha, 1886-88). Consult: Baguet, *De Chrysippi Vita, Doctrina et Reliquiis* (Paris, 1882); Zeller, *Philosophie der Griechen* (Leipzig, 1881).

CHRYS'OBER'YL (from Lat. *chrysoberyllus*, from Gk. χρυσοβήρυλλος, golden beryl, from χρυσός, *chrysos*, gold + βήρυλλος, *bēryllos*, beryl). A beryllium aluminate that crystallizes in the orthorhombic system. It has a vitreous lustre, and is found in various shades of green, and is sometimes red by transmitted light. The greenish varieties showing a chatoyant effect are called cat's-eye (q.v.), while opalescent specimens are named *cymophane*. Chrysoberyl was known to the ancients and was called *Oriental chrysolite* or *Oriental topaz*. It is found in Brazil, Ceylon, and in the Ural Mountains. A variety of an emerald-green color, but red by transmitted light, is called *alexandrite*, in honor of the Czar Alexander II. In the United States chrysoberyl occurs at Haddam, Conn., and at Norway, Stow, and several other localities in Maine. The largest transparent crystals are frequently cut into gems.

CHRYS'OCOL'LA (Neo-Lat., from Gk. χρυσόκολλα, *chrysokolla*, gold solder, from χρυσός, *chrysos*, gold + κόλλα, *kolla*, glue). A hydrated copper silicate that is cryptocrystalline. It is shiny, has a vitreous lustre, and varies in color from green to bluish-green and turquoise blue. It is found in Cornwall, England; Hungary; Siberia; Australia; Chile; and, with other copper ores, in New Jersey, Pennsylvania, Wisconsin, Michigan, Arizona, and elsewhere in the United States. When found in sufficiently abundant quantities it is a valuable ore of copper, as it contains when pure 45 per cent. of copper oxide. The name chrysocolla was applied by the ancients to any green mineral, as malachite, containing copper and capable of being used as a pigment.

CHRYS'OLITE (from OF. *crisolite*, Fr. *chrysolithe*, from Lat. *chrysolithos*, Gk. χρυσόλιθος, *chrysolithos*, from χρυσός, *chrysos*, gold + λίθος, *lithos*, stone). A magnesium-iron silicate that crystallizes in the orthorhombic system. It is of a green color, varying from yellow to brown, with a vitreous lustre, and when cut is prized as a gem-stone. Chrysolite is frequently found in lava, as at Vesuvius, and in the volcanic rocks of Sicily, the Azores, the Hawaiian islands, and elsewhere. Fine specimens have been brought from Egypt and sold for jewelry. In the United States it is found in the form of small, olive-green, pitted grains or pebbles, with garnet, in Arizona and New Mexico, where the grains are called 'Job's tears' on account of their pitted appearance. It also occurs in basalt near Montreal, and elsewhere in Canada. The so-called chrysolite of the jeweler is usually chrysoberyl, and the *chrysolithus* mentioned by Pliny is supposed to have been topaz. It is said that many of the so-called emeralds in European churches, as those of the 'Three Magi' in the Cathedral of Cologne, are chrysolites, and not emeralds.

CHRYSOLOGUS, krĭ-sŏl'ō-gŭs (Lat., from Gk. χρυσόλογος, from χρυσός, *chrysos*, gold + λόγος, *logos*, speech: referring to his oratorical powers), PETER (406-450). Bishop of Ravenna in 433. He opposed Arianism and Eutychianism. About a hundred genuine sermons of his have come down to us, though there are 76 others attributed to him. They do not bear out his reputation for eloquence, but show an earnest and spiritually minded nature. His works are in Migne, *Patrologia Latina*, LII. There is a partial translation into German by M. Held (Kempten, 1874). For his life, consult H. Dapper (Cologne, 1867) and F. V. Stablewski (Posen 1871).

CHRYSOLORAS, krĭs'ō-lō'ras, MANUEL (?-1415). A Byzantine Greek scholar, born in the middle of the Fourteenth Century. He has the distinction of being the first important teacher of Greek of the Renaissance. Toward the end of the Fourteenth Century his scholarship became famous in Italy, so that Guarino da Verona went to Constantinople to learn Greek of him. About 1393 he was sent by the Byzantine Emperor to the West to ask assistance from Italy and England against the Turks. While on this mission he became known to many Italians, and in 1396, being invited by the Florentine Republic, he settled in Florence as a teacher of Greek literature. Within the next few years Chrysoloras had, among the most eminent of his pupils, Niccolò Niccoli, Leonardo Bruni, Manetti, and others.

In 1400 he left Florence, and two years later he was teaching in Pavia, where he translated Plato's *Republic* into Latin. During the next decade he seems to have traveled in France, Spain, and England, and to have been engaged in teaching Greek in a number of Italian cities. He was employed by Pope Gregory XII. in an attempt to bring about the union of the Greek with the Roman Church. He accompanied John XXIII. to the Council of Constance, and died while it was in progress, April 15, 1415.

His most important work was his *Greek Grammar*, first published in Venice in 1484, which was for many years the standard work for Greek teaching in Italy and elsewhere. Another interesting work was his comparison of ancient and modern Rome (*Σύγκρισις παλαιᾶς καὶ νέας Ῥώμης*). Consult: Voigt, *Die Wiederbelebung des klassischen Alterthums*, I. (Berlin, 1895); Symonds, *Renaissance in Italy*, II. (London, 1877).

CHRYS'OPRASE (from Lat. *chrysoprasus*, Gk. χρυσόπρασος, *chrysoprasos*, from χρυσός, *chrysos*, gold + πράσον, *prason*, leek). A variety of chalcedony, the apple-green color of which is due to the presence of a small quantity of nickel oxide. It is found in Silesia, Germany, and near Riddles, Oregon, where it occurs in nickel ore in veins over an inch thick; also in Tulare County, Cal. Chrysoprase was formerly much sought after as a gem-stone, but as it loses its color if kept in a warm place, it is no longer much prized. It is mentioned in the Bible, and by the ancients was described as a gem of a yellowish-green color, the identity of which has never been definitely established. *Chrysoprase earth* is the name given to an apple-green variety of pimelite from Silesia.

CHRYSOSTOM, krĭs'os-tom *or* krĭ-sŏs'tom (from Gk. Χρυσόστομος, *Chrysostomos*, golden-mouthed, from χρυσός, *chrysos*, gold + στόμα, *stoma*, mouth; so named from the splendor of his eloquence), JOHN, Saint (c.345-407). One of the greatest Fathers of the early Church. He was born in Antioch in A.D. 345 or 347. He came of a patrician family. His father, Secundus, died soon after Chrysostom's birth. His mother, Anthusa, was a pious woman, wholly devoted to her son, who grew up under her loving instructions into an earnest, gentle, and serious youth, passing through none of those wild, dark struggles with sinful passions which left an ineffaceable impress on the soul of Augustine, and gave a sombre coloring to his whole theology. He studied oratory under Libanius, a heathen rhetorician, as he at first intended to be a jurist, and soon excelled his teacher; but, feeling called to give up worldly pursuits, he abandoned legal for biblical study. About 368 he was baptized and was ordained a reader. He practiced the strictest asceticism while still living at home, and on his mother's death, about 375, he retired to the desert around Antioch. After six years the ascetic severity of his life and studies brought on an illness which forced him to return to Antioch, where he was ordained deacon by Bishop Meletius in 381, and presbyter by Bishop Flavianus in 386. The eloquence, earnestness, and practical tone of his preaching excited the attention of Jews, heathens, and heretics, and secured for him the reputation of the chief orator of the Eastern Church. In 398 the eunuch Eutropius, minister of the Emperor Arcadius, who had been struck by the bold and brilliant preaching of Chrysostom, elevated him to the episcopate of Constantinople. Chrysostom immediately began to restrict the episcopal expenditure in which his predecessors had indulged, and bestowed so large a portion of his revenues on hospitals and other charities that he gained the surname of 'John the Almoner.' He also endeavored to reform the lives of the clergy, and sent missionaries into Scythia, Persia, Palestine, and other lands. His faithful discharge of his duties, especially in reproof of vices, excited the enmity of the Patriarch of Alexandria, of Theophilus, and of the Empress Eudoxia, who succeeded in deposing and banishing him from the capital (403). He was soon recalled, to be banished again shortly afterwards (404). He was taken during July and August to Nicæa, now Isnik, in Asia Minor, the place where the famous Nicene Council was held, and there, to his great disappointment, he learned that his place of banishment was to be Cucusus, a little town in the Armenian highlands, now called Gozene. It was a weary journey, but he finally arrived there. The Bishop of Cucusus received him kindly and the climate agreed with him. So his zeal was not abated. He labored for the conversion of the peoples in the neighborhood, and wrote the seventeen letters (or rather moral essays) to Olympias, to whom he also addressed a treatise on the proposition, "None can hurt the man who will not hurt himself." The Emperor, enraged by the general sympathy expressed toward Chrysostom by all true Christians, gave orders that he should be banished to the remote Pityus, on the northeast coast of the Black Sea at the foot of the Caucasus, a most desolate spot, and involving a journey of hundreds of miles on foot. It was at the very verge of the Eastern Roman Empire. The march was begun and for three months kept up, but when he reached the chapel of the martyr Basiliscus, about six miles from Comana, in Pontus, he could go no farther, and there died, September 14, 407, blessing God with his dying lips. The news of his death excited much sorrow among all pious Christians, for Chrysostom was a man who drew the hearts of his fellows after him; a lovable, manly Christian, hating lies, worldliness, hypocrisy, and all manner of untruthfulness, with that honest warmth of temper which all vigorous people relish. A sect sprang up after his death, or martyrdom as they conceived it, called *Johannists*, who refused to acknowledge his successors; nor did they return to the general communion till 438, when the Archbishop Proclus prevailed on the Emperor Theodosius II. to bring back the body of the saint to Constantinople, where it was solemnly interred, the Emperor himself publicly imploring the pardon of heaven for the crime of his parents, Arcadius and Eudoxia. The Greek Church celebrates the festival of Chrysostom on November 13; the Roman, on January 27. In his *Homilies* (Thomas Aquinas said he would not give those on Saint Matthew in exchange for the whole city of Paris) Chrysostom displays superior powers of exegesis. In general, he rejects the allegorical system of interpretation, and adheres to the grammatical, basing his doctrines and sentiments on a rational apprehension of the letter of Scripture. He is, however, far from being a bibliolater. He recognized the presence of a human element in the Bible as well as a divine; and instead of attempting, by forced and artificial hypotheses, to reconcile what he thought irreconcilable in Scripture statements, he frankly admitted the existence of contradictions, and shaped his theory of inspiration accordingly. But his greatest and noblest excellence lay in that power, springing from the fervor and holiness of his heart, by which the consciences of the proud, the worldly, and the profligate were awakened, and all were made to feel the reality of the Gospel message. The surname 'Chrysostom' was first applied some time after his death, and, as it is supposed, by the Sixth Ecumenical Council in 680. Chrysostom's works are very numerous, and consist of, 1st, *Homilies*, on parts of Scripture and points of doctrine; 2d, *Commentaries*, on the whole Bible (part of which has perished); 3d, *Epistles*, addressed to various people; 4th, *Treatises*, on different subjects (such as Providence, the Priesthood, etc.); and 5th, *Liturgies*. Of these the most valuable, as well as the most studied, are the *Homilies*, which are held to be superior to everything else of the kind in ancient Christian literature.

The most correct Greek edition of Chrysostom's works is that by Henry Savil (8 vols., Eton, 1613); and the most complete Greek and Latin edition is that by Montfaucon (13 vols., Paris, 1718-38; republished in 1834-40). There is an English translation in the first series of the *Nicene and Post-Nicene Fathers* (London and New York, 1889-90). For his biography, consult: W. R. W. Stephens (3d ed., London, 1883); R. W. Bush (London, 1885); F. H. Chase (London, 1887); A. Puech (2d ed., Paris, 1900); G. Marshal (Paris, 1898).

CHRYSOSTOME, krĭs′os-tōm. An aged student in Cervantes's *Don Quixote*. He dies of a broken heart.

CHRYS′OTYPE (from Gk. *χρυσότυπος*, *chrysotypos*, wrought of gold, from *χρυσός*, *chrysos*, gold + *τύπος*, *typos*, impression). A photographic process invented by Sir John Herschel, which depends on the reduction of a ferric salt to a ferrous salt by the action of light, and the subsequent precipitation of metallic gold on the ferrous salt. The process is now hardly ever used.

CHRZANOW, kzhä′nōv. A town in the Austrian Crownland of Galicia, 27 miles west-northwest of Cracow, the centre of an important mineral region. Lead, zinc, coal, and cadmium are mined. There is considerable trade in agricultural products. Population, in 1900, 10,200, mostly Poles.

CHRZANOWSKI, kzhȧ-nŏv′skė, ADALBERT (1788-1861). A Polish general, who participated in Napoleon's Russian campaign and in the battles of Leipzig, Paris, and Waterloo. After Napoleon's final defeat he served in the national army of Poland, and was under Diebitsch in Turkey in 1828-29. In the Polish Revolution of 1830 he served with distinction under the Provisional Government, rose to the rank of general of division, and in 1831 was made Governor of Warsaw. He was suspected of being friendly to the Russians, and was for a long time under a sort of ostracism. In 1849 he was chosen by Charles Albert commander-in-chief of the Sardinian forces in his second war against Austria. Ramorino and Chrzanowski were charged with treachery, and the former was put to death. Chrzanowski lived for a number of years in Louisiana, but died in Paris.

CHTHONIAN (thŏn′ĭ-*a*n) **GODS.** In Greek mythology, the deities connected with the government of the lower world, as Hades, Persephone, Demeter, and Hermes.

CHUB (variant of *cub*). A fish (*Leuciscus cephalus*) of the family Cyprinidæ, bluish-black on the upper parts, passing into silvery white beneath, with the cheeks and gill-covers golden-yellow. The chub is plentiful in many rivers of England and Continental Europe, rarely reaches a weight of 5 pounds, spawns in April and May, and affords sport to anglers. In the United States the name is applied to several species of this family, most familiarly to the horned dace (see DACE). The river-chub (*Hybopsis Kentuckiensis*) measures 9 inches, and is found on both sides of the Alleghanies. The chub of the Columbia River is *Mylochilus caurinus*, 12 inches long. See Plates of CARP AND ALLIES; and of DACE AND MINNOWS.

CHUB-MACKEREL. A mackerel (*Scomber colias*), widely distributed throughout both oceans in temperate latitudes, and a food-fish of some importance, though smaller than and inferior to the common mackerel. Its form is shown in the Plate of MACKERELS; the color is blue with about 30 wavy blackish streaks across the back. It is locally known by many names, as 'linker,' 'easter,' and 'thimble-eyed' mackerel; and in England as 'Spanish' mackerel. It is extremely numerous in the Mediterranean Sea.

CHUB-SUCKER. A small brown sucker (*Erimyzon sucetta*), called also 'creek-fish,' numerous in lakes and quiet streams throughout the central United States and along the Atlantic Coast. The sexual difference is strong, males in spring usually having three large tubercles on each side of the snout and the anal fin much swollen.

CHUBUT, chōō-bōōt′. A territory of Argentina, occupying the northern portion of Patagonia, and bounded by the Territory of Rio Negro on the north, the Atlantic on the east, the Territory of Santa Cruz on the south, and Chile on the west (Map: Argentine Republic, D 12). Its area is over 90,000 square miles. It is only slightly elevated in some parts, is traversed by the rivers Chubut and Senguer, and contains a number of lakes. Population in 1900, 4409. The chief settlement is Rawson, near the eastern coast, with a population of about 500.

CHUCKWAL′LA. A large, stout-bodied iguanid lizard (*Sauromalus ater*) of the desert region of the southwestern United States. It is the largest lizard of the Colorado River plateaus, except the heloderma. "The broad body is black or blackish and the large blunt tail is usually marked with white, or entirely white. It was generally found on lava or other dark rocks, with which its coloration harmonizes. It is a vegetarian, feeding entirely on the buds and flowers of plants, with the addition sometimes of a few leaves." It is much prized by the local Indians as an article of food, and when well cooked is liked by white men, its flesh resembling chicken. A name for it in southern California is 'alderman lizard.'

CHUCK-WILL'S-WIDOW (imitative of its cry). A large nightjar (*Antrostomus Carolinensis*) of the southern United States, whose call-note resembles its name, is articulated with great distinctness, and reiterated like that of its congener, the whippoorwill. It is a much larger bird than the whippoorwill, being a full foot in length, but has the same pattern of plumage. The mouth is enormous. The rictal bristles have prominent lateral branches, and both humming-birds and sparrows have been found in the stomach, though insects are its usual food. It lays its eggs on the ground, making no nest.

CHU′FA (Sp.). A name applied to *Cyperus esculentus*, a perennial sedge that spreads extensively by its underground rootstocks. It bears numerous small tubers, on which account it is also often called 'nut-grass,' or 'ground-almond.' The tubers are edible, and are eagerly sought after by hogs, which are frequently allowed to pasture upon them at will. Chufas grow well upon light, sandy soils, producing large crops. Upon land required for general farming they are liable to become a serious pest, on account of the difficulty of their eradication. When dried or parched the 'nuts' have a fine flavor. They contain considerable amounts of oil, starch, and sugar, the proportions of which vary considerably. The oil is sometimes expressed, and for culinary purposes is said to be unsurpassed. A similar species is *Cyperus rotundus*, to which the name nut-grass more properly belongs. Both are met with in a wild state in many parts of the United States, especially in the South.

CHUF′FEY. An old clerk, in the employ of Anthony Chuzzlewit, in Dickens's novel *Martin Chuzzlewit*. He lives in his master's house, and his reluctant recital of Jonas's villainy forms perhaps the most dramatic feature of the story.

CHUFU. Another name for Cheops (q.v.).

CHU-HI, chōō′hē′ (1130-1200). The modern apostle of Confucianism in its philosophical form, whose writings are the recognized standard of orthodoxy and the creed of educated men in China. He has been officially approved by successive imperial dynasties, and even canonized. His father was a Government officer, and he was born in Fu-kien. Precocious from childhood, he took his second degree before he was 20 years old. He devoted his leisure time when in office to studying Buddhism and Taoism, but throwing these aside after a few years, he became an enthusiastic student of the writings of the school men of the Sung Dynasty (A.D. 960-1126). Confucianism, under the analysis and exposition of the scholars Chow Tun-I and the brothers Cheng, had received a new statement, emerging as something like a philosophical system, instead of the ancient simple ethics and ritual. Chu-Hi, expanding and expounding the doctrines thus set forth a century before his day, won fame all over the empire, and was summoned by the Emperor to the Court for consultation in regard to things literary and political. He elucidated the doctrines of Confucius and Mencius, more especially with reference to the nature of man, the origin of good and evil, and the principles of creation. In 1180, as governor of a city in Kiang-si, he applied his principles and greatly improved public morals. His study room was the White Deer Grotto, on the hills near Lake Po-yang. Not content with philosophy, he summoned around him famous scholars, who were his pupils and worked over the great historical annals of Sze-Ma Kwang, and thus furnished the standard history of China; for Chu-Hi's work, having been many times since reprinted with commentary and continuation, has been widely read in all Chinese Asia. Nearly all the histories and biographies (apart from annals) written since his time in China, Korea, Japan, etc., have been powerfully influenced by Chu-Hi's model—that is, on the plan of philosophy and edification, being less consecutive narratives of events than appraisals of men and their actions as righteous and unrighteous, according to Chu-Hi's standards.

Chu-Hi extended his labors in every direction of metaphysical speculation, and his commentaries on the ancient writings of the sages have held the intellect of learned men of China and surrounding countries almost without challenge or criticism, until about the beginning of the second half of the Seventeenth Century, when they began to be vigorously assailed in China, and later in Korea and Japan. In Japan, Chu-Hi's system is called Tei-shu, which is the Japanese pronunciation of the names of the Cheng brothers and of Chu-(Hi). It was officially encouraged by Iyeyasu and his successors very much as a State Church, and to oppose it openly was at first politically dangerous. Its most famous Japanese expounders were Kyuso, Seiga, and Arai Hakuseki, the opponents of this orthodox school and the critics of Chu-Hi being Jinsai, Sorai, Togai, and others. The latter, forming the Kogaku school, was noted for its doubt of the truth of the teachings of Chu-Hi. Chu-Hi's philosophy in Japan, as well as in China, profoundly influenced the form and spirit of literature, both scholastic and popular; but in Japan, the Chinese teachings, becoming amalgamated in a common cause with Shinto, served powerfully to stimulate the national sentiment and feeling which overthrew the Shogun and Yedo Government and restored the Mikado to supreme power. Especially in the Province of Mito was this union of Chinese philosophy and Shinto teaching successfully carried out, powerfully influencing the minds of the gentry and scholars in bringing about the great revolution of 1868. Thus one of the strangest phenomena in history was witnessed in that the rule of the Tokugawa family (1604-1868) was first shaken and then overthrown by the very doctrine "which generations of able shoguns and their ministers had earnestly encouraged and protected."

In China, Chu-Hi's philosophy held its own until near the close of the Ming Dynasty (1368-1644), when Chinese scholars began to feel that Chu-Hi's system was too narrow to hold all the truth. As a result of the profound thinking stimulated by the Manchu conquest, a school of criticism and opposition arose whose demand was for a study of the ancient texts in their purity. By continuation and expansion of philosophical labor, and especially by coming into contact with Occidental science and speculation, modern reformers have come into view, whose activity and aims have been so obscured to Western minds by the Boxer uprising (1900) and the necessary foreign invasion.

In brief, the system promulgated by Chu-Hi is a body of thought which may be called the result of Chinese reflection during fifteen hundred years, put into logical Chinese form indeed, but in reality an amalgamation of the three systems or religions of China. It is the ethics of Confucius transfused with the mystical elements of Taoism and the speculations of Buddhism, though very little acknowledgment is made to any thought originating outside of the Confucian cycle. It is less rationalistic than pantheistic, for the cultivated Confucians believe in heaven as a bundle of laws and forces, or at least an orderly system of abstract principles and regulated energy, but with no clear expression of personality. Their voluminous discussions of Spirit, Way, Reason, Law, are about what is formless and invisible. When a term for Creator is used, it is a rare word and found only in the vocabulary of scholars. There is no clear grasp of the idea of a personal Creator. Man is the highest expression of the forces of the universe, and even gods and devils fear his determined mind. The ultimate realities are force and law. Man has no immortal soul; he is highest in the scale of existence, yet he is only one in the endless series. The station, duty, or position in life is greater than the individual, and it determines him. Hence, in Japan, while loyalty (not filial piety, as in China) is the root of the system, the high sense of honor and willingness of self-effacement in the line of duty. Hence, also, in China the determination at all hazards to 'save the face' of everything, and the making of form and ritual equal to substance and containing it. In Japan in the Twentieth Century, Chu-Hi's system is but a memory, or at most an evanescent shadow; in Korea it is powerful, yet rather as an adjunct to political economy; in China it still holds its own, but precariously, against the assaults of the modern radical reformers, of whom Kang Yu-Wei, who in 1899 emerged into notice as adviser to the Emperor, is the most conspicuous example and best known in the Occident.

CHUKCHI, cho͝ok'chē'. See Tchuktchi.

CHU-KIANG, cho͞o'kyäng' (Chinese, pearl river), called also the Canton River. A river of southern China, in the Province of Kwang-tung (Map: China, D 7). It is formed by the North and West rivers, which unite about 30 miles from Canton, which is situated at the head of its extensive delta. The estuary is very wide. The total length of the river is about 100 miles. The Si-Kiang is connected with the delta of the Chu-Kiang. See Boca Tigris.

CHUK'OR, or **CHICK'ORE** (Hind. *cakōr*, Skt. *cakōra*, partridge). The Anglo-Indian name of the common red-legged hill partridge (*Caccabis chukor*), a favorite game-bird in northern

India and westward to the Black Sea. See Partridge.

CHUMBUL′, or **CHAMBAL** (Skt. *Carmanvati*, having hides, from *carman*, hide). An unnavigable river of British India, rising in the Vindhya Mountains, which form the southern limit of the basin of the Ganges (Map: India, C 3). Its source, at a height of 2019 feet above the sea, is in latitude 22° 26′ W. and longitude 75° 45′ E. In its generally northwestern course of 514 miles, it receives many tributaries on both sides, till, in latitude 26° 30′ N. and longitude 79° 19′ E., it enters the Jumna from the right with such a volume of water that, when flooded, it has been known to raise the united stream 7 or 8 feet in twelve hours.

CHUN, kōōn, Karl (1852—). A German zoölogist, born in Höchst-am-Main. He studied the natural sciences in Göttingen and Leipzig, from 1872 to 1875. In 1878 he became a privatdocent in Leipzig; in 1883 professor of zoölogy in Königsberg, then in Breslau in 1889, and in Leipzig in 1898. He has written: *Das Nervensystem und die Muskalatur der Rippenquallen* (1878); *Die Ktenophoren des Golfs von Neapel* (1880); "Cœlenterata," in Bronn's *Klassen und Ordnungen des Thierreichs* (1891 et seq.); and many less important works.

CHUNAM′ (Tamil *cunnam*, Hind. *cūnā*, lime, from Skt. *cūrṇa*, powder). A very fine kind of quicklime made from calcined shells or from very pure limestone, and used for chewing with betel (q.v.), and for plaster. It is very white, and takes a high polish. Both recent and fossil shells are used for making chunam. Extensive beds of fossil shells employed for this purpose occur in the south of India, particularly in low, marshy situations near the seacoast. The chunam from Madras is among the best made. The shells used are in the first place very carefully cleaned; they are then calcined in kilns, with wood charcoal. When chunam is to be used for plaster, it is mixed with fine river-sand and thoroughly beaten up with water. The name is applied also to a weight for gold in northern India.

CHUNCHO, chōōn′chō. A group of savage and warlike tribes living in the forests at the extreme headwaters of the Ucayali River, central Peru. They live in communal houses, cultivate corn, bananas, and pineapples, and range the forests for game. They bury their dead in their houses, and are said to be afraid to be at any time in utter darkness for fear of evil spirits. On account of their ferocity, very little is definitely known of them: but they are believed to be closely related to the Anti (q.v.).

CHUNGA, chŭn̤′gȧ, or **CHUN′NIA** (Neo-Lat., from the native name). A crane-like bird (*Chunga Baumeisteri*) of Argentina, closely related to the çariama (q.v.), but smaller, darker, and more addicted to wooded districts. It is shy, has a barking note, feeds largely upon locusts, and nests on the ground; but the young are easily and commonly domesticated.

CHUNG-KING, chōōn̤′kĭng′ (Chinese, middle city). A city of China, the commercial capital of the Province of Sze-chuen and one of the most important commercial centres of western China (Map: China, C 6). It is situated in latitude 29° 33′ N. and longitude 107° 2′ E., on a small elevated peninsula at the confluence of the rivers Kia-ling and Yang-tse-kiang. It is surrounded by a strong stone wall, about five miles in circumference and pierced with nine gates. The climate is neither pleasant nor healthful. Chung-king was opened to foreign trade in 1891, and has since become the centre from which the imports for western China are distributed through the affluents of the Yang-tse-kiang. The population of the city, including the adjoining town of Kiang-peh-ting, which is incorporated with Chung-king, and also a number of surrounding villages, is estimated at about 300,000.

CHU′PRA. See Chapra.

CHUQUET. shu̇′kā′. Nicolas (c.1445-c.1500). A French mathematician. He was born in Paris and died in Lyons. His works, entitled *Le triparty en la science des nombres* (1484) has been copied many times, but was first printed in Boncompagni's *Bullettino di bibliografia e di storia delle scienze matematiche e fisiche* (Rome, 1880), from a manuscript in the Bibliothèque Nationale. The work consists of three parts: (1) Treatment of rational numbers; (2) treatment of irrational numbers; (3) treatment of equations. Chuquet used the successive convergents of a continued fraction to approximate roots of numbers (the method used by Etienne de la Roche), and called it *edioeion entre le plus et le moins.* In the Triparty appear not only the signs p and m̃ for plus and minus, but also expressions like

$$R^4 \cdot 10,\ R^2 \cdot 17 \text{ for } \sqrt[4]{10},\ \sqrt{17}.$$

Chuquet used the Cartesian exponent-notation $a^0, a^1, a^2 \ldots$ for $a, ax, ax^2 \ldots a^{1\tilde{m}}$ for ax^{-1}, the expressions equipolence and equipolent for equivalence and equivalent, and the words byllion, tryllion, quadrillion, quyllion, sixillion, septyllion, ottyllion, nonyllion, as well as million. Consult: Boncompagni, *Bullettino* XIII. (Rome, 1880); and Cantor, *Vorlesungen über Geschichte der Mathematik*, Vol. II. (Leipzig, 1900).

CHUQUISACA, chōō′kē-sä′kȧ, **CHARCAS** or **SUCRE**, sōō′krā (So. Amer. Indian, place of gold). A southeastern department of Bolivia, bounded by the Department of Santa Cruz on the north, Brazil on the east, Paraguay and the Department of Tarija on the south, and of Potosí and Oruro on the west (Map: Bolivia, E 8). Its area is estimated at from 40,000 to over 70,000 square miles, the variations being due to the undefined southern boundary of the State. The western part is mountainous and has a good climate. The eastern part is mostly flat and very sparsely inhabited. The forests are extensive, and plenty of grazing as well as agricultural land is found. The chief mineral deposit is silver, which is mined to some extent and exported. The civilized population was officially estimated in 1890 at 125,000, including 85,000 Indians and about 7,500 whites. Capital, Sucre (q.v.), which has been the capital of the republic.

CHUR, kōōr (Fr. *Coire*, It. *Coira*, Lat. *Curia Rhætorum*). The capital of the Swiss Canton of Grisons, and an episcopal city, situated on the Plessur, 60 miles southeast of Zurich in the valley of the Upper Rhine, in a fertile plain about 2000 feet above the sea, and surrounded by high mountains (Map: Switzerland, D 2). The town stands on uneven ground, has narrow streets, and is divided into high and low sections. The bishop's palace and the quarter around it, inhabited by the Roman Catholics, occupy the summit of an eminence, and are separated from the rest of the town by walls and battlements, closed by double gates. In the same quarter stands the old cathedral, called the Church of Saint Lucius, a Byzantine edifice, founded in the Eighth Century, and containing interesting paintings by Dürer and Holbein. The episcopal palace, in the Renaissance style, displays two old Roman towers and has rich archives and library. In the lower city are the town hall, with fine painted windows, the Rhætian antiquarian museum, the cantonal library, and two theological seminaries. Chur was formerly an important trade centre on the road from Germany to Italy before the construction of the Saint Gotthard Railroad. It flourishes still, owing to throngs of tourists, and to the traffic in wine, fruit, and agricultural products. Population, in 1900, 11,700. The town was settled by the Romans, who named it Curia Rhætorum, and from the Fifth Century it was an episcopal see. It was ruled by its bishops down to about the close of the Middle Ages. It entered the Confederation in 1498.

CHURCH (AS. *circe*, Ger. *Kirche*, from Gk. κυριακόν, *kyriakon*, church, from κύριος, *kyrios*, lord). The word has the same double meaning as its Græco-Latin equivalent, *ecclesia*: it signifies both the ecclesiastical body of believers and the building for worship.

BUILDING. There were at first, among the Christians, no separate buildings for worship. The faithful met in the large room of a private house during the First and possibly the whole of the Second Century. The gatherings at the cemeteries to celebrate the anniversaries of the deaths of martyrs probably gave rise to the earliest special buildings for services, in chapels connected with the cemeteries outside the city walls, often built also at the entrance to the catacombs. The catacomb chapels were also used as churches. In the Third Century there were separate churches of considerable size. Then and during the two succeeding centuries there were two main classes of churches: cemeterial churches outside the walls, consecrated to martyrs; parish churches inside the walls, for more regular worship. Then came two further distinctions: (1) the episcopal church or cathedral, at which the bishop had his seat, among the parish churches; (2) the conventual church, attached to a monastery or nunnery, also called an abbey church. There were occasions when a church belonged to both of these classes, for example, if the cathedral, as was usually the case in England, was a monastic foundation. A sub-class of the episcopal is the metropolitan church, that of the archbishop or patriarch of a diocese; still higher was the pontifical church—like the Lateran basilica. A sub-class of the conventual church is a priory, belonging to a monastery governed only by a prior. A numerous class of churches is formed of the rural or country churches, in charge of the country curate. Palatine churches and chapels belong to imperial, royal, or private palaces and castles.

The strict definition of a church is an ecclesiastical building for worship in which full service can be performed and the sacraments administered; in this it differs from oratories and chapels, where only prayers can be offered and the sacraments cannot be given, except occasionally, as on the patron saint's day. There was always a certain ceremony required for the consecrating and licensing of a church. The most famous early instance was that of the basilica at Tyre early in the reign of Constantine, when Eusebius pronounced his celebrated oration before a great assemblage of bishops and the court and people. Mediæval chronicles are full of descriptions of the magnificent reunions and festivals on such occasions. Often the popes were present with the college of cardinals at the consecration of cathedrals or large monastic churches. In every case the bishops of the neighboring dioceses gathered. No church could be built and opened without being consecrated by the local bishop or his representative. No early written formulas of consecration have survived, but there are a number dating from the period between the Tenth and the Thirteenth centuries, which show the development of an elaborate symbolism. The consecration was often recorded in a special inscription, with the names of the attending bishops.

A church consists of two essential parts: the *nave*, for the congregation, and the *sanctuary*, for the clergy. As distinguished from pagan methods of worship, the mass of believers was gathered within, not kept outside the place of worship. In fact, the *agapæ*, which were the original form of the Christian gathering, had so slight a liturgy as not to call for separation of clergy and people. The Third and Fourth centuries, however, with the development of Church organization and liturgy, witnessed the enrichment of church architecture. The semicircle of the *apse* (q.v.) held the presbyters and bishops; and in front of it was placed the *altar*; beyond the altar, the *choir* (q.v.) held the readers and singers, separated from the body of the church, or nave (q.v.), by a parapet, which inclosed the pulpits or ambones (one or two). The nave itself was at first generally single, the men being placed in front and the women behind; but very soon the form of the basilica with its side-aisles separated by columns was adopted, and the men were placed in one aisle, the women in the other, in order of rank and condition. In the Orient, however, the separation of the sexes, which was always considered necessary, was made even more effective by constructing galleries (q.v.) over the side-aisles, in which the women were placed. The use of martyrs' relics, soon required by Church regulations in every church, led to the construction of a shrine to contain them in or beneath the altar (q.v.). This shrine, called the *confession* (q.v.), developed, between the Sixth and Eighth centuries, into a monumental *crypt* (q.v.), sometimes filling the entire space beneath the church, but more often only under the choir, whose pavement was thus raised above the level of the nave. This arrangement, almost universal in monastic and other Romanesque churches, went out of fashion in the Gothic cathedrals.

Churches were often oriented, that is to say, were placed so that the apse faced the east (*ex oriente lux*) while the façade faced west. This was a part of Christian symbolism which bears a curious analogy to Old Testament (Garden of Eden) and ancient Oriental ideas, especially sun-worship. Over the door of the church was often an inscription such as "I am the Door," etc. The world was left outside. The wheel of fortune so often represented on the façade figured the vicissitudes of carnal life. Inside was the spiritual life. The church was consecrated to the people of God, "Plebs Dei"; its walls were covered with paintings or mosaics expressing all the themes of Christian history and belief necessary for the Christian people to know—the book of the unlearned. In the Orient, especially, but often also in the West, there was a strict order in the arrangement of sacred themes throughout the church, so that the people should be led gradually from the more elementary figurative subjects near the doors to the most fundamental and sacred ones in the sanctuary or apse, generally filled with the figure of the triumphant Christ and His attendant apostles and saints.

Speculation as to the origin of the form of the church is more or less idle. The connection with the already existing halls of the public and private basilicas is self-evident. The building was oblong, with a semicircular east end, on either side of which was a small room used to keep the treasures of the church and as a vestiary for the clergy. These sacristies were afterwards thrown into the church as side-apses. In some large early churches the form of a T was given to the plan by the addition of a cross-arm between apse and nave. (See BASILICA). The nave itself was flanked by one aisle on each side; sometimes by two aisles; sometimes also by lines of side-chapels, though this was not done until the later Middle Ages. The façade (q.v.), usually at the west end, sometimes took the outline of the nave and aisles, sometimes was an independent structure. Near it or connected with it was a bell-tower (q.v.), while as the Middle Ages progressed, towers were multiplied, especially in northern and central Europe, and became an integral part of the architectural composition. It was in the Carolingian period, under monastic influence, that the plan of churches was changed into the form of the cross (see CHRISTIAN ART; GOTHIC ART; ROMANESQUE ART), thus bringing in the *transept* (q.v.), and still later that the choir was so enlarged as almost and sometimes quite to rival the nave in size, as was the case in many Gothic cathedrals. Other forms, however, were sometimes in use: Concentric churches, either round or polygonal, such as San Stefano Rotondo in Rome, Nimeguen, Ottmarsheim, etc.; Greek crosses, as San Marco; in Venice, single-nave churches, sometimes domed, as in Byzantine architecture, sometimes vaulted or roofed, as in Dominican and Franciscan churches, whose hall form was invented for the sake of the sermon.

ACCESSORY STRUCTURES. There were many accessory structures connected with churches. The most usual were the *episcopal palace*, or the *parish house;* the *cloister* for the canons or monks attached to its service; the *chapels* dedicated to special saints and martyrs; the *baptistery*—in the case of churches where baptism was allowed; the *atria* or cloistered courts in front or beside the main building. The Cathedral of Parenzo shows a typical grouping. In front, the episcopal residence; then the baptistery, on the axis of the church; then the rectangular atrium surrounded by colonnades; then the church itself. This was the type from the Fourth to the Ninth Century. The cathedrals of the Twelfth and Thirteenth centuries show the perfecting of quite a different plan; all the structures in front of the church have disappeared and it fronts directly on the city street or square. This scheme has ever since been retained, except in monastic churches, which were within the conventual walls.

Church furniture and decoration were always a very important feature. A church was not regarded as completed in the Middle Ages unless it was covered with instructive sculptures or paintings, through which it carried out a large part of its mission. These decorations were not left to the artist, but planned by the ecclesiastical authorities. (See ICONOGRAPHY.) Mosaics, frescoes, tapestries, painted glass windows, within; sculptured reliefs and statuary, without, were used in profusion even in the times when art had fallen lowest. The throne for the bishop in the apse and the priest's seats surrounding it; the altar, its canopy and confession; the choir screen and seats; the ambones and pulpits and paschal candlestick; the altar pieces and fronts; the main and side altars; the choir-books; the altar-service; the monuments to great ecclesiastic and civil personages against the side-walls, in special chapels, and in floor-slabs; the hanging lamps and tapestries—all gave ample opportunity for rich display of color and form. The bishop and chapters were among the greatest art patrons. Saint Bernard's anger was excited by the very profusion of this ecclesiastical art; and he carried on a crusade for simplicity, which was successful only within his own order of Cistercian monks. A second reaction against church magnificence came with Protestantism, which destroyed so many churches, and in building its own usually showed the most rigid simplicity, to the great loss of art.

BIBLIOGRAPHY. Up to the time of the Renaissance the history of architecture is the development of the church building. Only general works can here be cited. The most complete work covering the whole ground is Dehio and Von Bezold, *Die christliche Baukunst des Abendlandes* (Stuttgart, 1884), plates and text still in course of publication. See also Hübsch, *Altchristliche Kirchen* (Karlsruhe, 1862-63); Lübke, *Vorschule zur Geschichte der Kirchenbaukunst des Mittelalters* (Berlin, 1858); Norton, C. E., *Church-building in the Middle Ages* (New York, 1880); Quast, *Entwickelung der Kirchenbaukunst des Mittelalters* (Berlin, 1858); Clausse, *Monuments du Christianisme au moyen âge* (Paris, 1893). For Germany, consult Schäfer, *Mustergiltige Kirchenbauten des Mittelalters in Deutschland* (Berlin, 1886); for France, Viollet-le-Duc, "De la construction des édifices religieux en France," in *Annales archéologiques*, I.-IV. (Paris, 1844-46). For the lesser church buildings, see Baudot, *Eglises de bourgs et villages* (Paris, 1867); Brandon, *Parish Churches* (London, 1848). For Protestant church architecture, consult Schultze, *Das evangelische Kirchengebäude* (Leipzig, 1885); and especially *Der Kirchenbau des Protestantismus* (Berlin, 1893), published by the Vereinigung Berliner Architekten, and treating the entire period from the Reformation till the present date.

CHURCH. An organization of Christians, generally defined by Protestants in substantial accord with the Articles of the Church of England—"a congregation of faithful men, in which the pure word of God is preached, and the sacraments be duly administered in all those things that are of necessity requisite to the same." The Roman Catholic Church emphasizes in addition the "rule of legitimate pastors," and especially subjection to the Bishop of Rome as Vicar of Christ. Under these general definitions a great variety of forms of outward organization are recognized. The *papal* government makes all authority finally dependent upon the Pope, who is the Bishop of Rome. The *episcopal* government is administered by bishops, who are all essentially equal in honor and authority, although there may be archbishops who have a certain priority and jurisdiction over other bishops in definite particulars. (See Bishop.) The *presbyterian* government puts authority in the hands of elders (q.v.), ministerial and lay, elected ultimately by the congregation. (See Presbyterianism.) The *congregational* government puts the entire authority over each local congregation of believers in that congregation alone. (See Congregationalism.) All Protestants understand by the true Catholic Church (invisible), the whole number of the truly regenerated. Various theories are held as to the manner in which the life of the Church is perpetuated, that maintained by the great majority of Christians, the members of the Roman Catholic, Eastern, and Anglican churches, being known as the theory of apostolic succession (q.v.), while the Protestant churches in general, agreeably to the definition quoted above, postulate no formal system of handing down the Church from age to age. For the discipline of the Church, see Discipline, Ecclesiastical. See also Creeds and Confessions; Sacraments; Worship.

Ever since the Emperor Constantine the Church has had the status of a corporation, and been enabled to hold property. This has consisted in lands and buildings and in invested funds, the income of which was variously applied to the purposes of the Church. Under the American system this property is derived solely from gifts of private individuals, but the State protects the Church in the enjoyment of its property. See Civil Church Law.

CHURCH, Alfred John (1829—). An English educator and author, born in London. He was educated at King's College, London, and at Lincoln College, Oxford; ordained (1853); assistant master of Merchant Taylors' School, London (1857-70); head master of Henley Grammar School (1870-72), and of Retford Grammar School (1873-80); professor of Latin in University College, London (1880-88); rector of Ashley, Tetbury, Gloucestershire (1892-97). He has done much to diffuse a knowledge of ancient culture. Among his works are a translation of Tacitus, in conjunction with W. J. Brodribb (1862-77); stories from Homer, Vergil, Livy, the Greek tragedians, and Herodotus: *Roman Life in the Days of Cicero* (1883); *Two Thousand Years Ago* (1885); *To the Lions*, a tale of the early Church; and *Carthage* (1886). Church also edited a collection of translations from Tennyson into Latin verse, under the title *Horæ Tennysonianæ* (1868).

CHURCH, Arthur Herbert (1834—). An English chemist, born in London. He received his education at King's College, London, and at the University of Oxford, and in 1863 was made professor of chemistry in the agricultural college of Cirencester. In 1879 he became professor of chemistry in the Royal Academy of Arts. He lectured at Cooper's Hill from 1888 to 1900, and presided over the Mineralogical Society from 1898 to 1901. Besides several new minerals, including churchite, which is named after him, he discovered the animal pigment turacin; and he also carried out a number of interesting researches in organic, inorganic, physiological, and industrial chemistry. His published works include the following: *Precious Stones* (1883); *English Earthenware* (1884); *English Porcelain* (1886); *Food Grains of India* (1886); *Color* (2d ed., 1887); *The Laboratory Guide* (1894); and *Food* (1901).

CHURCH, Benjamin (1639-1718). An early New England soldier, famous as an Indian fighter. He was born in Duxbury, Mass., founded the town of Little Compton, Mass., in 1674, and took an active part in the war against King Philip, who was finally defeated and killed by a force under Church, in 1676. In 1689 he commanded a futile expedition against the Indians in the Kennebec region, and in the following year was again sent into Maine, where he captured several Indian forts along the Androscoggin. In 1704 he commanded a force of about 700, which, in retaliation for the French and Indian attack upon Deerfield, destroyed Grand Pré and Beaubassin in Acadia. From memoranda kept by him, his son, Thomas Church, published in 1716 a book entitled *Entertaining Passages Relating to Philip's War—as also of Expeditions more lately made against the Common Enemy and Indian Rebels in the Eastern Parts of New England*—"a soldier's bluff narrative of his own dangerous and enticing adventures," which was widely read during the colonial period, appeared in numerous editions, and was reprinted in Boston under the editorship of H. M. Dexter in 1865-67.

CHURCH, Frederick Edwin (1826-1900). An American painter, a pupil of Thomas Cole. He was born in Hartford, Conn., May 4, 1826. The works which gave him prominence are a "View of East Rock, near New Haven," and "Scenes in the Catskill Mountains." He visited South America in 1853 and 1857; and in Ecuador and New Granada made sketches for a number of paintings, some of which have attained great celebrity, such as the "Heart of the Andes," "On the Cordilleras," and "Cotopaxi." Another celebrated work is the "Horse-shoe Fall, Niagara." He visited Jamaica, and afterwards Europe and the Holy Land. Some of his other works are "Damascus," "Jerusalem," "The Parthenon," and "Tropical Scenery." Church had a fine pictorial sense and good feeling for correct composition, but his attention to and fondness for details often marred the breadth of his most important canvases. His sense of landscape seems mainly pictorial, and as he antedated the new movement of light and air which of recent years has done so much to remove landscape from the merely pictorial school, his work depended largely on scenic interest for its popularity. He sought remote countries and unfamiliar regions for his subjects, which he often painted on a large scale; but, owing to his want of breadth in treatment, they have failed to be permanently impressive. He drew with care, and filled his canvases with multitudinous details which excited respect for his skill; but they are not convincing proofs of a profound love of the verities of nature, and are far removed from the sincerity of Constable, let us say, who, much earlier, influenced for good all landscape art in America. He died in New York City, April 7, 1900.

CHURCH, Frederick Stuart (1842—). An American animal and figure painter. He was born in Grand Rapids, Mich., and studied with Shirlaw in Chicago and Wilmarth in New York. He is a member of the National Academy, Society of American Artists, and American Water-color Society. Among his pictures are "Weirdness," "Mad as March Hares," and "The Sea Princess," in oil; and "Hard Times" and "The Phantoms," in water-colors. He exhibited "Saint Cecilia" in 1896. He also exhibited, in the National Academy of Design, 1901, "The Sea-Serpent." Church has a sensitive and delicate feeling for color which he realizes more fully through his use of water-color than in the medium of oil. His conceits partake somewhat of the German order of fancy and are quaint, sometimes humorous, and sometimes philosophic. His sense of composition and line is graceful and decorative.

CHURCH, Sir Richard (1784-1873). A British soldier. He served for many years in the British Army, during which time (in 1809 and 1812) he raised two regiments of Greek light infantry, in vain attempts to free the Peloponnesus. In 1827 he was called to Greece by the struggling patriots, and was chosen generalissimo of the land forces. He coöperated in the revolutionary movement of 1843 which gave Greece a constitutional government, and thereafter, until his death, lived in Athens.

CHURCH, Richard William (1815-90). An English author, and a clergyman of the Established Church. He was born in Lisbon, studied in Oxford, was appointed a Fellow of Oriel, and was Dean of Saint Paul's from 1871 until his death. He is chiefly known as a scholar and writer. His long list of publications includes: *Essays and Reviews* (1854); *Civilization and Religion* (1860); *University Sermons* (1868); *The Beginning of the Middle Ages* (1877); and able volumes on *Bacon* (1879) and *Spenser* (1879), in the "English Men of Letters" series. A uniform edition of many of his works appeared in 1888, and a posthumous work on *The Oxford Movement* was published in 1891.

CHURCH ALE. An annual festival, held in England in a churchyard or near a church, at which much ale was used. It is said by some to have celebrated some anniversary, as the dedication of a church, or Easter or Whitsuntide. The profits were used for church repairs. Church ales are now represented by village fairs, wakes, etc.

CHURCH CALENDAR. A table of holy days, saints' days, church festivals, and the like. The earliest now existing, which contains the Christian festivals, is that of Silvius, A.D. 448. A fragment of a Gothic calendar remains, which probably belongs to the Fourth Century. The name is applied also to the *fasti* or catalogues for particular churches, of the saints most honored by them, such as bishops, martyrs, etc. At the Reformation the German Lutheran Church retained the Roman calendar. The full calendar of the Church of England contains nine columns, giving the golden number, days of the month, the dominical or Sunday letter, the calends, nones and ides, the daily Scripture lessons, and the holy days of the Church, together with some of the Roman festivals which have been retained, not as having any religious value, but because the practice of the courts or popular customs had become interwoven with them. The calendar of the Protestant Episcopal Church in the United Stated retains only the festivals which are referable to a scriptural origin.

CHURCH CONGRESS. The name of free gatherings of ministers and laymen of the Established Church of England, annually convened for the discussion of ecclesiastical and religious questions. The first church congress was held in 1861 in Cambridge and in the following years successively in Oxford, Manchester, Bristol, York, etc. The attendance is usually very large, and comprises many bishops and lower dignitaries. Full reports of the proceedings of each session are published. Such meetings, having the advantage of free interchange of views, but with no claim to ecclesiastical authority, have been found very profitable; and in the Protestant Episcopal Church of the United States they have been held since 1875 in the years when the General Convention does not meet.

CHURCH DIET. The free gathering of ministers and lay members of German Protestant churches. Such meetings arose in consequence of the revolutionary movement of 1848, which threatened to endanger the influence of the Evangelical Church upon society. Members of the Lutheran, Reformed, the United Evangelical, with the High Church 'confessionals,' participated in the earlier meetings; but after 1860 only the evangelical parties were represented. Annual reports are published.

CHURCH DISCIPLINE. The means employed by the Christian Church, besides the ministration of word and sacraments, to secure on the part of its office-bearers and members a faithful adherence to their profession and a corresponding blamelessness of life. It rests upon the authority of Christ, and at the same time necessarily arises, in some form, out of the very constitution of the Church as a society. Among the early Christians it soon assumed forms of great severity toward offenders, especially toward the *lapsed* (q.v.). At a later period the discipline of the Church was chiefly exercised with respect to persons accused of heresy and schism. The penances of the Church of Rome have long formed an important part of its discipline, and therewith its *indulgences* (q.v.) are closely connected, as well as its doctrine and rule of *auricular confession.* (See Confession.) In the Protestant churches, public confession of sins by which public scandal has been given, and submission to public rebuke, are sometimes required. Practices more analogous to those of the primitive Church were established in many churches after the Reformation, but in general have fallen greatly, or entirely, into disuse. The power of exclusion from the Lord's Supper, and from the rights and privileges of church membership, is, however, generally retained and exercised, until, by profession of repentance, and by reformation of life, the cause of such exclusion is removed; and ministers or other office-bearers are, upon offense given in their doctrine or conduct, suspended from their functions, or altogether deposed from their office. The exercise of church discipline belongs more or less exclusively to a hierarchy, or to the office-bearers assembled in church courts, or to the members of each congregation, according as the church is Episcopalian, Presbyterian, or independent in its church government. There is an increasing tendency among Christians in general to scrutinize closely the claim of right to exercise church discipline, and the limits within which it may be exercised.

Legality of Church Discipline. In the United States, church discipline is administered exclusively by church officials and judicatories. The complete separation of Church and State deprives the civil tribunals of all power to revise or question ordinary acts of church discipline, or of exclusion from church membership. Secular tribunals have to do only with the rights of property and of personal liberty. If these are illegally invaded, under pretext of administering church discipline, the civil courts have authority to afford redress. See Civil Church Law.

Whether a church member is amenable to ecclesiastical punishment is to be determined by the proper officers or judicatories of the particular church, in accordance with its rules of government and discipline. From their final decision no appeal lies to a civil court. In the language of the United States Supreme Court: "The law knows no heresy, and is committed to the support of no dogma, the establishment of no sect. The right to organize voluntary religious associations to assist in the expression and dissemination of any religious doctrine, and to create tribunals for the decision of controverted questions of faith within the association, and for the ecclesiastical government of individuals, congregations, and officers within the general association is unquestioned. All who unite themselves to such a body do so with an implied consent to this government, and are bound to submit to it." The disciplinary authority of such bodies, and the rights and duties of their members, are governed by the same general rules of law that control in case of social or political clubs or other private organizations. See Religious Societies; and compare Canon Law and Club.

CHURCHES OF ASIA, The Seven. The churches addressed in the opening chapters of the Book of Revelation, under the following names: Ephesus, Smyrna, Pergamum, Thyatira, Sardis, Philadelphia, and Laodicea, the order being geographical, though it begins with Ephesus as the church of the most important city.

From the qualities assigned these churches in the above chapters, Smyrna, in spite of her poverty, possessed the most commendable spiritual life, being designated in its message as rich. ("I know thy tribulation and thy poverty, but thou art rich," ii. 9.) This was perhaps due to its continued exposure to persecution, which later (c.155) resulted in the martyrdom of its bishop, Polycarp, at the instigation of the hostile Jews of the city. Its endurance remained a characteristic of its life, Smyrna being the last Christian city in Asia Minor to yield to Turkish rule (1424). On the other hand, in spite of its wealth, Laodicea possessed the least commendable spiritual life, and is spoken of as in the unendurable condition of lukewarmness. ("Because thou art lukewarm, and neither hot nor cold, I will spew thee out of my mouth," iii. 16.) Little is known of its Christian life, though later it became the leading bishopric of Phrygia.

Of the remaining churches, Philadelphia is commended in terms almost equal to those addressed to Smyrna, though betraying, along with its fidelity, a lack of strength in its religious living, doubtless due to the smallness of the church's numbers. ("I know that thou hast a little power, and didst keep my word, and didst not betray my name," iii. 8). Sardis, however, is rebuked almost as severely as Laodicea, the message reading, "I know thy works, that thou hast a name, that thou livest and art dead" (iii. 1); though a reservation is made of a few names in the church which are worthy (verse 4). Both churches became bishoprics, though Philadelphia finally took the place of Sardis (A.D. 1316).

With the life of the churches of Ephesus, Pergamum, and Thyatira fault is found in each case, chiefly because of failure to separate the religious life clearly and distinctly from the life of the irreligious world. Ephesus continued for centuries the important ecclesiastical centre of western Asia, being the place of the Council of Ephesus (A.D. 431). Of the later history of the churches of Pergamum and Thyatira little or nothing is known, though Pergamum became a bishopric and so continued through the Byzantine period.

It was to this group of churches—or at least to a portion of them—that Paul's encyclical letter to the Ephesians was sent. See Ephesians, Epistle to the.

CHURCH GOVERNMENT. See Church; Church Discipline; Bishop; Independents; Presbyterianism.

CHURCH HISTORY. The history of the Christian religion and Church, or of the world under its relations to ecclesiastical organization. The earliest writers of Church history were, in general, mere annalists or chroniclers, following the order of the time; but the modern philosophic treatment of history has led to the adoption of less mechanical and arbitrary methods. With much diversity on minor points, there is a general agreement in dividing the history of the Church into three great periods: The first, from the birth of Christ to the time of Constantine; the second, from that epoch to the Reformation; and the third, from the Reformation to the present day. The earliest facts of Church history are to be learned only from the New Testament and from the brief hints in the letters and other writings of the primitive fathers. Hegesippus, a Jewish Christian of the latter half of the Second Century, put together some memorials of these early times; but his work has survived only in a few quotations. The real father of ecclesiastical history is Eusebius of Cæsarea (died c.350). His work was continued to the Fifth Century by three important historians—Socrates, Sozomen, and Theodoret. In the West attempts were made to translate, combine, and complete these Eastern histories by Rufinus, Sulpicius Severus, and Cassiodorus. In the Sixth Century Theodorus Lector, Zacharias, and Evagrius were of some importance. But the stagnation which came over Eastern theology was felt in the historical department, and only one Greek author is worth naming throughout the whole of the Middle Ages—Nicephorus Callistius, a priest of Constantinople who wrote in the early Fourteenth Century, and who drew his materials from the library of the Church of Saint Sophia, of which he had charge. In western Europe, on the other hand, the stirring religious life which found expression in so much development of doctrine and discipline also led to the careful recording of important events. The product of this literary activity falls into three main classes—histories of separate peoples; attempts at universal histories; and the mass of annals, chronicles, and bibliographies. The most prominent names in the first class are: Isidore of Seville, for the Goths and Vandals; Gregory of Tours, for the Franks; Bede, for the Anglo-Saxons; and Paulus Diaconus for the Lombards. The earliest mediæval attempt at a general Church history was made by Haymo of Halberstadt (died 853); another followed in 872, by Anastasius, the librarian of the Roman Church. Ordericus Vitalis produced a notable work about 1412. But the greatest general history written in the Middle Ages was that of the Dominican Antoninus, Archbishop of Florence from 1446-59. In places, especially in his account of the donation of Constantine, he shows an awakening of the critical spirit which was fostered by Laurentius Valla and Nicolas of Cusa. The third class is far too large to treat in detail. A *catalogue raisonné* of it may be found in Potthast, *Bibliotheca Historiæ Medii Ævi* (Berlin, 1862), or in Chevalier, *Répertoire des sources historiques du moyen âge, Bio-bibliographie* (Paris, 1886.).

A new era began for ecclesiastical history about the end of the Fifteenth Century. The critical tendency aroused by the revival of letters, the bringing to the West of early Greek texts, the rendering of sources accessible by the invention of printing, and the controversial spirit of the Reformation, which forced both sides to attempt to justify their position by history—all these made great changes in the method. About the middle of the Sixteenth Century the Magdeburg Centuriators (q.v.) undertook their great work with a view of proving the utter iniquity of all that had ever been done by the Papacy, which to them was Antichrist, and though they had unusual scholarship and knowledge of sources, their polemical bias detracted much from the value of their work. It called forth a counter-blast from the Catholic side in the *Annals* of the Oratorian Baronius, who had access to an immense number of valuable documents; while of course he was not a modern historian, yet he produced a work far in advance of any previous attempt, and accepted so generally that a century passed before any other work of the same scope was undertaken. The next important work from the Roman Catholic standpoint came from France, as part of the general efflorescence of the reign of Louis XIV. The names of Godeau (died 1672), Maimbourg (died 1686), Fleury (died 1724), and still more Natalis Alexander (died 1724) and de Tillemont (died 1698), deserve to be remembered. Of modern French works—all these are Roman Catholic—the best are Rohrbacher (died 1856), Darras, and Guettée. Italy does not supply many names of excellence in the general field; the most notable are Orsi (died 1761), de Graveson (died 1733), and Berti (died 1766). The Italians distinguished themselves more in special studies, particularly Mansi, Muratori, de Rossi, Moroni, and Tiraboschi. In Germany there has been since the Reformation a continuous tradition of apologists for that movement and its principles. Special histories of it were composed by Sleidan and Seckendorf. In the Seventeenth Century Calixtus distinguished himself in this department, and, after him, Illig, Rechenberg, and Thomasius. In the general field, still from the Lutheran side, there are the mystic Arnold (died 1714), Mosheim (died 1755), and his pupil, Schröckh (died 1808); Semler (died 1799), who led the way to a more rationalistic treatment; and Planck (died 1833). In modern times the first great name is Neander (died 1850), and F. C. Baur, who followed out the impulse of Semler, has had much influence. Baur's work was continued by his son, F. Baur, and his son-in-law, Zeller. Hase (died 1890) holds a middle ground between Baur and the more orthodox; and later still in time come Harnack, Hauck, and Loofs. Other historians in the Reformed churches have been largely specialists, such as Pearson, Dalläus, Dodwell, Beveridge, Bingham, Usher, Cave, and Blondel. The Church of England, to which some of these names belong, and which produced in the middle of the Nineteenth Century Milman's *History of Latin Christianity* and the work of Robertson, has later been adorned by the learning of Stubbs and Creighton. A succession of learned German writers in the Roman Catholic Church dates from Count von Stolberg (died 1819), whose work was continued by von Kerz, Brischar, and Katerkamp. Others of this school are Hortig (died 1847), Ritter (died 1857), Alzog (died 1878), Hefele (died 1893), Cardinal Hergenröther (died 1890), and Pastor. In America, Church history has not been much cultivated, but the best general historian is Philip Schaff. Others who have done good service are G. P. Fisher, J. H. Hurst, and H. C. Sheldon. The modern tendency everywhere, as in other branches of learning, is toward specialization rather than an attempt to cover the entire field; and a multitude of works bearing on the history of particular churches and periods will be found referred to in the bibliography of the articles on those subjects. For bibliography of a more extended nature, consult: Hagenbach, *Encyklopädie und Methodologie der theologischen Wissenschaften* (12th ed. by Reischle. Leipzig, 1889); Crooks and Hurst, *Theological Encyclopædia* (New York, 1884), which is based upon Hagenbach; and, for the names of Roman Catholic works, Hurter, *Nomenclator Literarius* (5 vols., Innsbruck, 1871-86).

CHURCH'ILL, Charles (1731-64). An English poet, born in Westminster, where his father became a curate. He was educated at Westminster School, and two years later, at 17, made a clandestine marriage. In 1756 he was ordained, and soon afterwards succeeded his father as curate of Saint John's, Westminster. In 1761 he published anonymously (at his own risk, the booksellers having offered him only five guineas for it) *The Rosciad*, a satire on theatrical managers and performers. Its success was instant, and he avowed himself the author. Later in the same year he brought out *The Apology*, a bitter attack on his critics, which added alike to his purse and to his notoriety. He now totally neglected the duties of his office, and led a most dissolute life. His parishioners were scandalized, and his dean remonstrated; whereupon, to show his utter contempt for the ministerial profession, Churchill appeared in a blue coat, gold-laced hat and waistcoat, and large ruffles. He was obliged, however, to resign his preferment. A friend of John Wilkes, he contributed to the *North Briton*. Among his other poems, all more or less satirical, are: "Night;" "The Prophecy of Famine: A Scot's Pastoral;" the "Epistle to Hogarth:" "The Author;" "The Candidate;" "The Ghost;" "Gotham;" and "The Duellist." He died November 4, 1764, while on a visit to Wilkes in Boulogne. Consult the Aldine edition of his works, containing notes by Tooke, and the life by Hannay (London, 1892).

CHURCHILL, JOHN. See MARLBOROUGH, JOHN CHURCHILL, DUKE OF.

CHURCHILL, Lord RANDOLPH HENRY SPENCER, usually called Lord RANDOLPH CHURCHILL (1849-95). An English Conservative statesman. The third son of the seventh Duke of Marlborough, he was born at Blenheim Palace, February 13, 1849. He was educated at Eton, and Merton College, Oxford, and entered Parliament in 1874 as member for Woodstock. The same year he married the brilliant Miss Jennie Jerome of New York, who, as a prominent member of the Primrose League, gave him valuable assistance throughout his political career. He was a quiescent member until 1880, when the Conservative defeat roused him to action as the leader of the Fourth Party—a small band of keen-minded Conservatives. He distinguished himself as a ready, unconventional debater, attracting particular attention by his audacious criticism of Gladstone's foreign and domestic policy. He became still more prominent as chairman of the Conservative Union (1884), and in 1885 unsuccessfully attempted to defeat Mr. Bright in Birmingham, but was returned for South Paddington, which was kept in reserve for him. From June, 1885, to January, 1886, he was Secretary of State for India, his period of office being marked by the annexation of Burma. For six months in 1886 he was Chancellor of the Exchequer, but resigned, expressing the resolve "to sacrifice himself on the altar of thrift and economy." Thenceforward he incisively criticised governmental expenditure, although always voting with his party. He was the exponent of Tory democracy, and had a considerable following of young Conservatives, who looked upon him as Lord Beaconsfield's successor. "Congenital causes" suddenly occasioned a failing of power; and in 1892 he sought recuperation by travel and hunting in South Africa, sending interesting descriptions of his tour to the *Daily Graphic*, and publishing a volume entitled, *Men, Mines, and Animals in South Africa* (1892). During his absence he was reëlected, but he died January 24, 1895. Consult Escott, *Life of Lord Randolph Churchill* (London, 1895).

CHURCHILL, WINSTON (1871—). An American novelist, born in Saint Louis, November 10, 1871. A graduate of the United States Naval Academy (1894), Churchill first attracted attention by naval stories in magazines. He wrote *The Celebrity* (1898), a novel, but first became widely known through *Richard Carvel* (1899), which was followed by *The Crisis* (1901), a story of the Civil War.

CHURCHILL, WINSTON LEONARD SPENCER (1874—). An English author, son of Lord Randolph Churchill. Educated at Harrow and Sandhurst, he entered the army in 1895, serving in that year with the Spanish forces in Cuba, and receiving the order of Military Merit. In 1897 he served with the Thirty-first Punjab Infantry, and received a medal with clasp for his conduct in Bajaur. He also acted as orderly officer to Sir William Lockhart with the Tirah expeditionary force in 1898, and was with the Twenty-first Lancers in the Nile expeditionary force, again receiving a medal with clasp for his services at the battle of Omdurman. On the outbreak of the Boer War (1899) he went to the Transvaal. On November 15, he was taken prisoner by the Boers while acting as correspondent for the *Morning Post*. He was imprisoned at Pretoria, but escaped later in the year. In September, 1900, he was elected Conservative member of Parliament for Oldham. He has written: *The Story of the Malakand Field Force* (1898); *The River War* (1899); *Savrola* (1900); *London to Ladysmith via Pretoria* (1900); and *Ian Hamilton's March* (1900).

CHURCHILL RIVER. A tributary of Hudson's Bay from the west, its waters being discharged into Churchill Harbor at Fort Churchill (Map: Northwest Territory, K 3). This river is in water connection with a large series of lakes in Keewatin, Athabasca, and Saskatchewan, and itself consists of a series of lakes and intervening narrower river channels. Through Reindeer or Caribou Lake the Churchill River appears to be in connection with Wollaston or Great Hatchet Lake, a portion of the water of which flows into the Mackenzie River. Properly speaking the headstream of the Churchill River is Beaver River, which rises in northeastern Alberta. The general course of the Churchill River is at first east and then northeast: the direct distance from the source to the mouth is about 800 miles.

CHURCHING OF WOMEN. A religious usage prevailing in the Christian Church from an early period, of women, on their recovery after child-bearing, going to church to give thanks. It appears to have been borrowed from the Jewish law (Lev. xii. 6). In the Church of the early ages it was accompanied with various rites, and in the Greek and Roman Catholic churches it is still frequent. In the Church of England, also, a service for the churching of women finds its place in the liturgy. It takes place after the fortieth day from parturition.

CHURCH OF ENGLAND. See ENGLAND, CHURCH OF.

CHURCH OF ENGLAND, FREE. See REFORMED EPISCOPAL CHURCH.

CHURCH OF GOD. A religious denomination in the United States, sometimes called Winebrennerians, whose doctrines agree generally with those of the Baptists. It originated in a revival which took place under the preaching of the Rev. John Winebrenner, a German Reformed pastor, at Harrisburg, Pa., and other places. Mr. Winebrenner's views having undergone some change, he met with other elders, in 1830, and they adopted a basis of Church organization, the leading points of which were that the believers in any given place are, under the divine order, to constitute one body; that divisions into sects and parties under human names and creeds is contrary to the spirit of the New Testament; that the believers of any community, organized into one body, constitute God's household or family, and should be known as the Church of God: that the Scriptures, without note or comment, constitute a sufficient rule of faith and practice, while creeds and confessions tend to divisions and sects; and that the ordinances of immersion in water in the name of the Trinity, the washing of the saints' feet, and the partaking of bread and wine in commemoration of the suffering and death of Christ, are binding upon all believers. The organization of the Church consists of seventeen annual elderships, covering districts in fourteen States and the Indian Territory, and a general eldership, composed of delegates from the annual elderships, meeting every three years, which has charge of general concerns, with an executive board serving three years. The words 'Church of God' in the titles of the general and annual elderships have recently been changed to 'Churches of God.' No official statistics are compiled. The ministerial register for 1901 contains 465 names. Other estimates for 1900 give 580 churches and 38,000 communicants. The Church of God has a college at Findlay, Ohio, with an endowment approaching $100,000, and an academy at Barkeyville, Pa.; has a large bookstore and publishing house at Harrisburg, Pa.; sustains a missionary in India, in part of the territory assigned to the Free Baptist Church, and is also represented by missionaries working in other foreign fields and under other boards; and has, further, an active Woman's Missionary Society. It is interested in beneficiary education for the ministry, and is making progress in educational matters generally. Its organs are: *The Church Advocate*, weekly; *The Workman*, quarterly; and five Sunday-school helps (all Harrisburg, Pa.). Consult: Winebrenner, *A Brief View of the Church of God* (Harrisburg, Pa., 1840); id., *Practical and Doctrinal Sermons* (Harrisburg, 1860). *A History and Doctrines of the Church of God* is in preparation by J. H. Forney, under direction of the general eldership.

CHURCH OF GOD IN CHRIST. See MENNONITES.

CHURCH OF THE NEW JERUSALEM. See SWEDENBORGIANS.

CHURCH RATES. In England, a tax or assessment laid on the parishioners and occupiers of land within a parish, by a majority of their own body in vestry assembled, for the purpose of upholding and repairing the fabric of the church and the belfry, the bells, seats, and ornaments, the churchyard fence, and the expenses (other than those of maintaining the minister) incident to the celebration of divine service. The parishioners are convened for this purpose by the church-wardens (q.v.). The chancel (q.v.) being regarded as belonging peculiarly to the clergy, the expense of maintaining it is laid on the rector or vicar, though custom frequently lays this burden also on the parishioners, as in London and elsewhere.

The church rates were anciently a charge on the tithes of the parish, which were divided into three portions—one for the structure of the church, one for the poor, and the third for the ministers of the church. This distribution is said to have originated with Pope Gregory I., who enjoined Saint Augustine thus to divide such voluntary offerings as might be made to his missionary church in England. A canon of Archbishop Ælfric, in 970, and an act of the Witenagemote in 1014, in Ethelred's time, have been quoted in proof of the recognition of this rule by our Saxon fathers. It seems to have been their custom, also, to devote to the repair of each church a portion of the fines paid for offenses committed within the district attached to it; and every bishop was bound to contribute to the repair of his own church from his own means. A third of the tithes thus originally devoted to the repairs of churches continued to be applied to that purpose under the Normans down to the middle of the Thirteenth Century; and the manner in which this burden came to be shifted to the parishioners has been a subject of much discussion among legal antiquarians. Lord (then Sir John) Campbell, who published a pamphlet on the subject in 1837, is of opinion that the contributions of the parishioners were at first purely voluntary, and that, the custom growing, it at last assumed the form of an obligation, and was enforced by ecclesiastical censures. The care of the fabric of the church, and the due administration of its offices, are laid upon the ministers and the church-wardens conjointly, and the latter may be proceeded against by citation, in the ecclesiastical courts, should they neglect these duties. But there is no legal mode of compelling the parishioners as a body to provide the rate; and this circumstance has occasioned much difficulty in imposing the tax in parishes in which dissent is prevalent, and led to many churches falling into a partially ruinous condition. The proper criterion for the amount of church rates is a valuation of the property within the parish, grounded on the rent that a tenant would be willing to pay for it. Glebe land, the possessions of the Crown in the actual occupation of the sovereign, and places of public worship, are not liable for church rates; but there is no other exception as regards immovable property, and in some parishes custom even extends it to stock in trade. It has been often decided in the courts that a retrospective church rate—i.e. a rate for expenses previously incurred—cannot be validly imposed. Much difficulty has been experienced in recovering the rates imposed by the parish on individuals refusing to pay. Previous to 53 Geo. III., chap. 127, the only mode was by suit in the ecclesiastical court. That statute, however, in all cases under £10, empowered the justices of the peace of the county where the church was situated, on complaint of the church-wardens, to inquire into the merits of the case, and order payment. Against the decision of the justices an appeal lies to the quarter sessions. In 1868 an end was put to all parochial contentions by enacting that no suit or proceeding should thereafter be allowed in any court to enforce or compel payment of a church rate, except where a local act authorized this rate. But, except so far as related to the compulsory payment of these rates, the church-wardens might, as before, make, assess, receive, and deal with such rates. In each district parish the inhabitants may treat their own church as if it were their parish church, and make and receive rates for the repair of the same. A body of trustees may now be appointed in each parish to receive contributions for ecclesiastical purposes in the parish.

CHURCH TEMPERANCE SOCIETY. A national organization of the Episcopal Church in the United States for the promotion of temperance. It was founded in New York in 1881, on the lines which the Church of England Temperance Society had been pursuing for ten years previously. Its president is the presiding bishop of the Church. The society stands for a policy of high license as opposed to prohibition, and has done effective work through legislative channels. It has also endeavored to provide substitutes for the saloon, the 'Squirrel Inn,' on the Bowery, in New York City, being the most notable example. In the same city it maintains lunch-wagons, and has built and maintained seventeen free ice-water fountains. In connection with the society's work there is a Church Temperance Legion, which provides moral, civic, and military training for boys.

CHURCH TRIUMPHANT, The. A church founded by George Schweinfurth, who was born in Marion, Ohio, in 1853. He left the ministry of the Methodist Episcopal Church soon after entering it, and became a follower of a Mrs. Beekman, who professed to be "the spiritual mother of Christ in His second coming." Before her death, in 1883, she declared Schweinfurth to be "the Messiah of the New Dispensation," and her followers adhered to him. He claimed to have received the same spirit as Christ, and to be equal with Him and sinless, and to have power to perform miracles, to bestow the spirit upon others, and to free from the curse and save from the commission of sin. The Church Triumphant does not believe that Christ was essentially divine, but that He was a man who had experienced freedom from the power and curse of sin, and then received the spirit of God and became divine. The religious services are without rites, ceremonies, or forms of worship, and consist chiefly of the reading of the sermons prepared by Schweinfurth. The principal centre of this Church is at a place called Mount Zion, near Rockford, Ill., where it has a special building. According to the latest published enumeration, it has 4 societies, with 340 members, in the States of Colorado, Illinois, Kentucky, Michigan, and Missouri. Consult H. K. Carroll, *The Religious Forces of the United States* (New York, 1893).

CHURCH-WARDENS. In England, ecclesiastical officers, elected sometimes by the parishioners and ministers jointly, sometimes by the minister alone, and sometimes by the parishioners alone, for the purpose of protecting the edifice of the church, superintending the celebration of public worship, and to form and execute other parochial regulations. They are generally two in number. (See Church Rates; Parish; Vestry.) In the Protestant Episcopal Church of the United States wardens are annually elected by each parish in Easter week; their duties, which are regulated by diocesan and not by general canons, being virtually the same as those of the corresponding English officials, omitting such as relate to a Church established by the State.

CHURCH'YARD, Thomas (1520?-1604). An English versifier and miscellaneous writer, born at Shrewsbury. He was a servant in the household of the Earl of Surrey; served in the military in Ireland, the Low Countries, and France; and from 1560 poured forth an amazing number of broadsides, pamphlets, and other more pretentious works, generally dedicated to some noble lord, seldom paid for, and now largely forgotten. Disraeli (*Calamities of Authors*) says that "he was frequently employed to supply verses for court masques and pageantry," and adds that he composed such pieces for the entertainment of Queen Elizabeth at Norwich. He died in poverty and neglect. His best effort is *The Worthiness of Wales* (1587; reissued in fac-simile in 1871 by the Spenser Society), a national poem of some interest to the antiquarian and historian.

CHURN (AS. *cyrin*, Icel. *kirna*, Dan. *kjerne*, churn, dialectic Ger. *Kern*, Nicel. *kjarna*, cream). A machine for agitating milk or cream, for the production of butter. The principle of the operation is considered in the article on Butter-Making (q.v.). Mere gentle stirring of the cream, if continued long enough, will bring butter; and agitation of the cream by means of bubbles of air passed through it will accomplish the same result. The oldest form of churn was the upright or plunge churn. This was laborious, and was superseded by the dash churn, and by a form in which the cream was agitated by means of floats or paddles. There were many kinds of these, with arrangements for cooling or heating the cream. But these injured the texture of the butter, because of the effect of the stirring motion on the grain of the first particles of butter formed. Barrel churns and rectangular churns, hung upon the lower or the shorter axes, have come into very general use, and box churns which are oscillated, often called swing churns, are much used, especially in small dairies.

The best churns are entirely hollow vessels of the barrel or box shape, which agitate the cream through concussion of the particles upon the sides of the churn. The churn should not be entirely filled; it should be left half, or preferably only one-third, full. Although the yield of butter is not much diminished by increasing the amount churned at one time, the time required for churning is increased, and the temperature is raised at the end of churning, which is decidedly injurious to the butter, making it softer and more difficult to handle. The speed of the churn is an important factor, in point of both time and completeness of churning. Too rapid churning gives the cream the motion of the churn, and the particles of butter-fat are not brought into contact with each other. The labor of churning has been very greatly decreased in the modern churn, and forms have been made in which dog-power, horse-power, and steam-power are employed. The power churns, of immense size, are usually employed in creameries. The combined churn and butter-worker has been described under Butter-Worker (q.v.). The butter-extractor is essentially a cream-separator and continuous churn combined. The butter made with this machine is, of course, sweet-cream butter.

CHURN-OWL or **CHURR-OWL.** A provincial name in Great Britain for the nightjar (q.v.); also 'fern-owl.'

CHUROYA, chōō-rō'yȧ. A tribe living upon the Meta and Upper Guaviare rivers, eastern Colombia. They are of low physical type, very ugly, and go entirely naked, decorating their bodies with tattooing, in default of clothing. With several other tribes of the same region, they constitute a distinct linguistic stock.

CHUR'RUS. See Hemp.

CHURUBUSCO, cho͞o′ro͞o-bụs′kô. A village 6 miles south of the City of Mexico, on the river Churubusco, connected with the capital by an elevated paved causeway. Here, on August 20, 1847, immediately after the battle of Contreras, occurred one of the most important battles in the war between the United States and Mexico. The Mexicans, under the command of Santa Anna, numbered about 30,000, most of whom were stationed in a strongly fortified *tête-de-pont*, and in the large convent or church of San Pablo. The Americans, numbering about 9000, and commanded by Gen. Winfield Scott, attacked with the greatest gallantry, and finally, after three hours of fighting, drove the Mexicans from their position. The Mexicans lost, in killed, wounded, and prisoners, fully 7000; the Americans, in killed and wounded, about 1100. This battle is sometimes grouped with those of Contreras and San Antonio, also fought on the 20th, under the general name, battles of Mexico. Consult: Wilcox, *History of the Mexican War* (Washington, 1892): General Scott, *Autobiography* (New York, 1864); and Bancroft, *History of Mexico*, Vol. V. (San Francisco, 1885).

CHUSAN, cho͞o′sän (Chinese, Boat Island). An archipelago off the coast of China, consisting of the island of the same name and a few smaller islands (Map: China, F 5). The island of Chusan is situated about 40 miles northeast of Ning-po, is of an oblong shape, and about 50 miles in circumference. Its surface is mountainous; but there are many fertile valleys with a plentiful supply of water, and the soil is very carefully cultivated by the hardy and independent people who inhabit the island. The flora is of remarkable richness. Azaleas clothe the mountains; clematis, roses, and honeysuckles grow in great luxuriance. The camphor and tallow tree, and many varieties of bamboo, are found in the valleys. Tea is cultivated to some extent on the hillsides. Among the minor islands the most interesting is Putu, an islet covered with temples and inhabited by numerous monks, and consecrated entirely to religious purposes. Administratively the group belongs to the Province of Che-kiang. Population is estimated at from 200,000 to 500,000. The chief settlement is Tinghai, a fortified town, with a population of about 30,000.

CHUTIA NAGPUR, cho͞o′tĕ-ȧ näg-po͞or′. See Chota Nagpur.

CHUT′NEE, or **CHUTNY** (Hind. *chatnī*). An East Indian condiment, a compound of mangoes, chillies or capsicum (q.v.), and lime-juice, with some portion of other native fruits, such as tamarinds, the flavor being heightened by garlic.

CHUZ′ZLEWIT, Anthony. The father of Jonas and uncle of young Martin, in Dickens's *Martin Chuzzlewit.* He is a sly, grasping old miser.

CHUZZLEWIT, Jonas. The cousin of young Martin, and son of Anthony, Chuzzlewit, in Dickens's *Martin Chuzzlewit.* He is a low, ignorant fellow, who ill-treats his wife, tries to poison his father, and commits a brutal murder. See Pecksniff.

CHUZZLEWIT, Martin. The hero of Dickens's novel of the same name. He is, at first, an unsuccessful apprentice to a hypocritical architect named Pecksniff. He leaves the latter in contemptuous anger, goes to America, and, after making various amusing acquaintances there, falls ill, and is brought back by his faithful follower, Mark Tapley. He is finally reconciled with his exacting grandfather, also named Martin, and marries a protégée of the latter, with whom he has long been in love.

CHWOLSON, Kvöl′sôn, Daniel (1820—). A Russian archæologist. He was born, of Jewish parentage, at Vilna, and was educated at Breslau, Vienna, and Saint Petersburg. He later embraced Christianity, and became professor of Oriental languages and literature at the University of Saint Petersburg (1855), and professor of Hebrew and of biblical archæology at the ecclesiastical academy in that city. His principal works, devoted chiefly to the subject of Oriental ethnography, include: *Die Ssabier und der Ssabismus* (2 vols., 1856), a valuable work to the student of religious science; *Concerning Some Mediæval Accusations Against the Jews*, in Russian (1861); *Ibn Dasta's Accounts of the Khazars, Burtassi, Bulgarians*, in Russian (1867); *Die semitischen Völker* (1872): *The Last Supper and the Day of Christ's Death*, in Russian (2d ed., 1880; German, 1892).

CHYAVANA, chȧ-vä′nȧ. Described in the Rigveda as a Rishi, whose youth the Ashvins restored. The character and myth are elaborated in the *Shatapatha Brāhmaṇa* and in the *Mahābhārata.*

CHYLE, kīl (from Neo-Lat. *chylus*, from Gk. χυλός, *chylos*, juice, from χεῖν, *chein*, to pour). One of the products of the transformation of food in the alimentary canal. On remaining for some time in the stomach, food is partially dissolved, forming a thick, grayish, turbid liquid called *chyme.* The chyme, which passes onward into the small intestine, is acted upon by the bile, pancreatic fluid, and intestinal juice, and through their influence is separated into *chyle*, which is absorbed or sucked up by the lacteals (q.v.), and into matters unfit for nutrition, which ultimately find their way out of the system by the intestinal canal. The mode in which this nutritious chyle is taken up by vessels distributed over the small intestines, and the changes which it undergoes before it is converted into true blood, are described in the articles Lacteals; Thoracic Duct; and Nutrition. When obtained from the thoracic duct of an animal during the process of digestion, chyle is a white milky-looking or yellowish fluid, with a faintly alkaline reaction. Like the blood, it coagulates in about ten minutes after its abstraction from the body of the animal; and in about three hours a small but distinct gelatinous clot is separated from the serous fluid of the chyle, the surface of which is pink, owing to the immature red blood-corpuscles proper to the chyle. On examining chyle under a microscope, we find that it contains numbers of white corpuscles, a small number of developing red corpuscles, oil-globules of varying sizes, also fatty granules together with fibrin. Each oil-droplet is enveloped in an albuminous envelope. The chemical constituents of chyle are neutral fats, some fatty acids, lecithin, cholesterin, serum-albumin, globulin, fibrin, sugar, urea, leucin, sodium chloride, phosphates, and iron. See Digestion.

CHYME, kīm. See Chyle; Digestion.

CHYTRÄUS, kė-trā′o͞os (Neo-Lat., from Gk. *χυτραῖος*, *chytraios*, made of earthenware, from *χύτρα*, *chytra*, pipkin; a translation of his family name *Kochhafe*, lit. cooking-pot), David (1530-1600). A Lutheran theologian. He was born at Ingelfingen, Württemberg, studied at Tübingen and Wittenberg; was a pupil of Melanchthon, and became professor of theology at Rostock. His learning and talents gave him a high position, and he was employed by Maximilian II. to arrange the affairs of the Evangelical Church in Austria. He was the principal author of the statutes of Helmstedt, and one of the authors of the *Formula of Concord*. He left a number of important theological works.

CIALDINI, chäl-dē′nė, Enrico, Duke of Gaeta (1811-92). An Italian general, politician, and diplomat. He was born at Castelvetro, near Modena, and studied in the University of Parma. He took part in the abortive insurrection of 1831, and was forced to escape to Paris. In 1833 he fought in Portugal, and in 1835 he joined the Spanish Army. At the outbreak of the Italian Revolution of 1848, Cialdini took command of a regiment of Piedmontese infantry, and subsequently was captured by the Austrians. In the Crimean War he commanded the third division of the Sardinian contingent, and took a distinguished part at the battle of the Tchernaya. At the beginning of the war of 1859 he was intrusted by Cavour with enlisting the famous corps of sharpshooters known as the Cacciatori delle Alpi ('Hunters of the Alps'), afterwards commanded by Garibaldi. The fourth division of the army was led by Cialdini, who won the victory of Palestro, but further progress of the Italians was stopped by the peace of Villafranca. In 1860 Cialdini defeated the Papal army under General Lamoricière, at Castelfidardo. Diplomacy delayed the fall of Gaeta till February 13, 1861, when it yielded to Cialdini. He was now made General of the Army and Duke of Gaeta. Turin erected a statue to the victor, and Reggio elected him Deputy. He became Senator in 1864, and took a prominent part in the campaign against Austria in 1866, replacing Lamarmora as Chief of the General Staff. In 1876-79 and 1880-81 he was Ambassador to France.

CIAMPI, chäm′pė, Ignazio (1824-80). An Italian poet and historian, born in Rome. He studied law there, attained considerable reputation as an attorney, and became a member of the Roman Council of State. From 1874 until his death he was professor of modern history at the University of Rome. Among his poetical works are *Serena* (1857), the collection *Poesie varie* (1857), the epic *Stella* (1858), and a complete edition entitled *Poesie* (1880). His valuable historical studies include *La città etrusca* (1866), *Innocenzo X. e la sua corte* (1878), and, most important, the *Storia moderna della scoperta dell' America alla pace di Westfalia* (2 vols., 1881-83; ed. by Castagnola).

CIAMPI, Sebastiano (1769-1847). An Italian author, born at Pistoja. From 1803 to 1818 he was a professor in the University of Pisa, and from 1818 to 1822 at Warsaw. His publications include: *Memorie della vita di Messer Cino da Pistoja* (1808), *De Usu Linguæ Italicæ saltem a Sæculo Quinto* (1817), and a *Bibliografia critica delle antiche reciproche corrispondenze dell' Italia colla Russia, Polonia*, etc. (1834-43). He also did much to further the study of art history.

CIAMPOLI, chäm′pō-lė, Domenico (1855—). An Italian author, born at Atessa, in the Abruzzi. He was called to the chair of the history of literature in the Lyceum of Ancona. His chief literary work has been in the domain of prose fiction, with scene in the wild Apennine region. The *Fiabe abruzzesi* (1877) and *Conti abruzzesi* (1880) are examples. As a critic of Slavic literature, he published *Melodie russe* (1881), and other volumes.

CIANÇA, thē-än′thä, Andres de (c.1500—). A Spanish judge, born at Peñafiel. He went to Peru with Pedro de la Gasca in 1546, became a member of the royal audience, and was president of the audience in 1550-51, from the departure of Gasca for Panama until the arrival from Spain of Don Antonio de Mendoza, the second viceroy. He was a judge of the court-martial which, after the battle of Sacsahuana, in 1548, condemned to death Gonzalo Pizarro (q.v.) and Francisco de Carbajal (q.v.).

CIARDI, chär′dė, Guglielmo (1844—). An Italian painter. He was born in Venice, studied at the Academy there, and further perfected himself in his art in Munich and Paris. His landscapes are effective; but he is best known for his marine views, drawn for the most part from the waterways of Venice, or the immediate environs of the city. His canvases have been widely and successfully exhibited. Among them may be mentioned "Porte d'Anzio" (1879), "Lagoons in the Sunshine" (1883), "Canale della Giudecca" (1885), "After the Storm" (1886), "Clouds of Spring," and "Venetian Lagoons with Fishing-boats."

CIBAO, sē-bä′ō. A central mountain range of Santo Domingo, Haiti (q.v.) (Map: West Indies, M 5). It extends 20 miles from northwest to southeast and attains an altitude of over 7000 feet in the highest peaks of the island. The chief rivers of Haiti rise in the range; between the mountains and along the north coast extend the fertile valley and plain of Santiago, watered by the Yaque. Columbus supposed the range to be part of the Cipango (Japan) of Marco Polo. Gold in considerable quantities has been found here since Ojeda's first expedition of discovery in 1494.

CIBBER, sĭb′bẽr, Caius Gabriel (1630-1700). A Danish-English sculptor, born at Flensburg, in Schleswig. He was sent to Rome to study, and then went to England with the sculptor Stone. Among his works are the figures of "Melancholy and Raving Madness," once over the entrance to the Bethlehem Hospital, but now in the South Kensington Museum; the phœnix above the south door of Saint Paul's Cathedral, and one of the bas-reliefs on the Monument of London. His son was Colley Cibber, the dramatist.

CIBBER, Colley (1671-1757). An English actor and dramatist, born in London. In 1682 he was sent to the free school at Grantham, in Lincolnshire. Five years thereafter he returned to London, and in 1688 was a volunteer in the forces raised by the Earl of Devonshire in support of the Prince of Orange. He afterwards turned to the stage, and after performing gratuitously for several months, he obtained an engagement at 10s. per week, which was raised to

15s.; and on the commendation of Congreve, who had witnessed his performance of Lord Touchwood, five additional shillings per week were added. Cibber now began to take the leading parts in many comedies, and soon established his reputation as an actor. In the meantime he was writing comedies. *Love's Last Shift* was produced in 1696, and thereafter followed 29 more plays. As a dramatist, Cibber claims to have done much toward the reformation of the stage. However immoral individual scenes in his plays may be, the libertines are reclaimed in the last act. As playwright and comedian, he was closely connected with Drury Lane Theatre, of which he became manager in 1710. He retired from the stage in 1733, though after that date he occasionally reappeared. Three years before he had been appointed poet laureate. The poems he now wrote were worthless, and exposed him to scathing ridicule. Pope made him the hero of the new *Dunciad* (1742). After retiring from the stage, Cibber began his famous *Apology*, which appeared in 1740. This book is not only an important history of the Queen Anne stage; it is one of the most amusing autobiographies ever written. Cibber died December 12, 1757. Consult Cibber, *Apology*, ed. by Lowe (London, 1888).

CIBBER, SUSANNAH MARIA (ARNE) (1714-66). An English actress. She received instruction in music from her brother, Dr. Arne; first appeared publicly in 1732, and rose to great public favor in opera and oratorio. She was an especial favorite with Handel and was the first Galatea in his *Acis and Galatea*. He wrote the contralto songs in the *Messiah* and the part of Micah in *Samson* expressly for her. Two years after her marriage to Theophilus, son of the dramatist Colley Cibber, which took place in 1734 and proved very unhappy, she appeared as an actress, and soon gave her entire attention to tragedy, excelling as Constance of Bretagne in *King John*, and as Ophelia in *Hamlet*.

CIBOL, sĭb′ŏl. See ONION.

CIBO'RIUM (Lat., from Gk. *κιβώριον*, *kibōrion*, shell, cup). A term used mainly in two distinct senses: (1) for an altar-canopy, and (2) for a vase to contain the reserved Sacrament, from which communion is ordinarily given in the Roman Catholic Church. From the earliest times after Christianity emerged from the catacombs (Fourth Century) the high altar in a Christian church or basilica was surmounted by a canopy resting on columns, and made of gold, silver, bronze, or marble. These canopies were among the richest pieces of church furniture and were decorated with reliefs, statues, and a variety of architectural details. The earliest metal ciboria, of which many superb examples were given by the Popes to Roman churches, have not survived the melting-pot. The marble ones of the Sixth Century, at Ravenna and Parenzo, are among the earliest. That given by Justinian (Sixth Century) to Saint Sophia, in Constantinople, was the most sumptuous. Of mediæval marble examples, there are many in Rome: of the classic type, at San Lorenzo and San Giorgio; of the Gothic type, at Santa Cecilia and the Lateran, decorated with mosaics and sculpture. A remarkable Lombard example is at Sant' Ambrogio, Milan; another at San Marco, Venice. Many others are in the churches of southern Italy (Eleventh-Fourteenth centuries). This custom was abandoned throughout Europe, except in Italy, after the Thirteenth Century, the altar being left uncovered. Since the Sixteenth Century the ciborium, in this sense, has been called in Italy a baldachin (q.v.). See ALTAR; CANOPY.

The second meaning, which is now the more usual, designates a closed vase to contain the Host. Such receptacles were originally (Fourth-Eighth centuries) in the form of a dove, made of gold, silver, or gilt copper, suspended over the high altar from the ciborium. Sometimes they were inclosed in a tabernacle in the shape of a tower. Then the dove-shaped receptacles were, in the Ninth Century, replaced by pyxes (q.v.) or small cylindrical boxes of gold, silver, ivory, etc., which had been already in partial use. These were suspended over the altar or placed in a small niche in the wall near the altar, in churches where there was no ciborium over the altar. The primitive connection between the constructive ciborium and this receptacle for the reserved Sacrament caused the name ciborium to be applied to the latter in late mediæval times, when the use of the constructive ciborium had ceased; but the term pyxis is the more correct name. The wall-niche in which the ciborium is placed was also called ciborium; it had decorative architectural door-reliefs and a frontispiece; and some of those executed during the Italian Renaissance are exquisitely sculptured.

CIBRARIO, chê-brä′rê-ō, GIOVANNI ANTONIO LUIGI, Count (1802-70). An Italian historian and politician. He was born in Turin, studied at the university of that city, and took his degree of doctor of laws in 1824. King Charles Albert of Sardinia, with whom he was a great favorite, sent him in 1848, when Italy rose against the Austrians, as royal commissioner to Venice. During the same year he was created a Senator of the kingdom. When Charles Albert—after the unfortunate issue of the war—went to live in voluntary exile at Oporto, Cibrario was sent by the Sardinian Senate to induce him to return. In 1850 he was appointed Superintendent-General of Customs, and negotiated a treaty of commerce with France. In 1852 he was made Minister of Public Instruction by Victor Emmanuel, and in 1855 he became Minister of Foreign Affairs in Cavour's Cabinet. He resigned his position in the following year, and he thenceforth devoted himself mainly to historical research. He died at Salò, in the Province of Brescia. His fame as a historian rests on the following works: *Notizie sulla storia dei principi di Savoia* (1825); *Delle storie di Chieri* (1827); *Dell' economia politica del medio evo* (1839); *Storia della monarchia di Savoia* (1843); *Storia di Torino* (1847); *Della schiavitù e del servaggia e specialmente dei servi agricoltori* (1868). Consult Odovici, *Il conte Luigi Cibrario* (Florence, 1873).

CICA'DA. One of the Cicadidæ, a family of homopterous bugs, composed, for the most part, of large insects, very few measuring less than one inch across the opened wings, while many are as large as seven inches. The fore wings are usually transparent, but in some forms are highly pigmented, especially with black and yellow. About 800 species are known, mostly tropical.

Habits, etc.—The life of an adult cicada is noisy and short. These are, indeed, the noisiest insects in the world. Darwin heard them while on the *Beagle*, when it was anchored a quarter of a mile from shore. Only the males give the note. "Happy," said the Greek poet Xenarchus, "the cicadas' lives, for they have voiceless wives." As no special auditory organs have been detected, it has been suggested that cicadas are capable of feeling rhythmical vibrations only. The sound-making organs which the males possess fully developed, and the females only partly, are peculiar to the cicadas. They consist of enlargements of the metathoracic epimera, in the form of an opercular covering beneath which there is a very complicated apparatus. The sound is made by the rapid vibration of one of the membranes called the timbal. The other two membranes probably are set in vibration by the first, and, in connection with the opercula, the three stigmata and the whole skeleton of the insect, intensify the sound. The females are provided with powerful ovipositors. The eggs are deposited in the twigs of trees or shrubs or in the stems of herbs. The young hatch out in a few weeks, drop to the ground, and begin there a long subterranean existence. They feed on the sap from the roots of trees. The larvæ may penetrate as deep as twenty feet below the surface of the ground, where it is difficult to make out their life-history. The manner of transformation from the larva to the pupa we do not know. The pupa is incased in a hard shell and when about ready to emerge from the ground may construct a chimney of earth several inches in height, but whether this is a purposeful act or not we do not know. When the pupa crawls out of the ground it fastens itself to some firm object, such as a wooden fence or a tree-trunk, the skin splits along the dorsal line of the thorax, and through this the adult winged insect emerges. The pupal skin when dried still retains the shape of the pupa, and may be found attached to the support several days after the adult has flown away.

In the United States the two commonest forms are the dogday harvest-fly (*Cicada tibicens*) and the periodical cicada or 13 to 17 year locust (*Cicada septendecim*). The harvest-fly is the black-and-green one that appears every year in midsummer, and gives out its prolonged, shrill, and to many persons nerve-racking, cry from tree-tops during the heated hours of the day; this form matures in two years, but since there are two different broods, one appears every year.

The Periodical Cicada.—This species requires from 13 to 17 years for development, according, mainly, to the temperature of the locality in which it breeds. Heat hastens its development, hence the 13-year forms occur in the South, but in each locality there are always some individuals that come out a year or two ahead of the main brood and others that lag a few years behind. This form has the greatest longevity of any known insect. The time of its periodicity has been made out by noting its appearance in certain localities for a considerable number of years, twenty-two broods having thus been determined. Several of these broods, which are dimorphic, may coexist in the same locality. Hence larvæ of different ages, of several generations, may be found in the ground at one and the same time and they will appear as adults in different years. The sound made by these insects is peculiar, very loud, and closely resembles the humming of a resonant telegraph pole when its wires are vibrating in a strong breeze.

Consult: Woodworth, "Synopsis North American Cicadidæ," in *Psyche*, Vol. V. (Cambridge, Mass., 1888). For the 'seventeen-year locust' see "The Periodical Cicada," an illustrated monograph of 148 pages, by C. L. Marlatt, *Bulletin 14 of the United States Department of Agriculture* (Washington, 1898). See LOCUST.

CICADA-KILLER. See SAND-WASP.

CIC′ATRIZA′TION (from Fr. *cicatrisation*, from *cicatriser*, to scarify, from Lat. *cicatrix*, a scar). The process of healing or skinning over of an ulcer or broken surface in the skin or in a mucous membrane, by which a fibrous material, of a dense, resisting character, is substituted for the lost tissues. The new tissue, in such a case, is called the cicatrix, and consists of fibrous connective tissue, with a tendency to contract, a lack of elasticity, and a white, shining appearance. The glands and other special structures of the original tissue are wanting in the cicatrix. See INFLAMMATION; ULCER.

CICCIONE, chė-chō′nā, ANDREA. An Italian sculptor and architect, born in Naples in the first part of the Fifteenth Century. He modeled the fine tombs for King Ladislas (1415) and for Caracciolo in the Church of San Giovanni at Carbonara. He was also the architect of the cloister of Santo Severino, the church and monastery of Monte Oliveto, and several other palaces and churches.

CICELY, sĭs′ė-lĭ (corruption of *seseli*, from OF., Lat. *seselis*, from Gk. σέσελι, *seseli*, cicely) (*Myrrhis*). A genus of umbelliferous plants, nearly allied to chervil. One species, sweet cicely (*Myrrhis odorata*), is common in the central and southern parts of Europe, and in similar climates in Asia, but in Great Britain it appears to have been introduced. It is sometimes called myrrh in Scotland. It is a branching perennial, two feet high or upward, with large triply pinnate leaves and pinnatifid leaflets, somewhat downy beneath; the whole plant is powerfully fragrant, the smell resembling that of anise. The seeds, roots, and young leaves are used in Germany and other countries in soups, etc. The plant was formerly much in use as a medicinal aromatic. In the United States, sweet cicely is the name given to the species of Osmorrhiza, a genus closely related to Myrrhis.

CI′CER. See CHICK-PEA.

CIC′ERO, MARCUS TULLIUS (106-43 B.C.). The greatest orator of Rome, and one of the most illustrious of her statesmen and men of letters. He was born at Arpinum January 3, B.C. 106. He belonged to an ancient family, of the equestrian order, and was possessed of considerable influence in his native district. His father, himself a man of culture, and desirous that his son should acquire an eminent position in the State, removed him at an early age to Rome, where, under the direction of the orator Crassus, he was instructed in the language and literature of Greece, and in all the other branches of a liberal education. In his sixteenth year he assumed the *toga virilis*, or manly toga, and was introduced to the public life of a Roman citizen. He now acquired a knowledge of law, and underwent a complete course of training in oratory. At the same time he studied philosophy under three successive instructors, of the Epicurean, Academic, and Stoic schools, and neglected no mental exercise, however arduous, which might conduce to his future eminence; being thus early of the opinion which he afterwards maintained in his treatise *De Oratore*, that an orator should possess almost universal knowledge. With the exception of a brief campaign under Sulla, in the Social War, he passed his time in these preliminary studies until his twenty-sixth year, when he began to plead in public. In one of his earliest causes he distinguished himself by defending the rights of Roscius, a private citizen, against one of the favorites of Sulla, who was then dictator.

Soon after, for the benefit of his health, and to pursue his oratorical studies, he traveled to the chief seats of learning in Greece and Asia, and on his return was regarded as second to no orator at the Roman bar. Having been elected quæstor (B.C. 76), he was appointed by lot to a government in Sicily, a post which he filled with great ability, and to the entire satisfaction of those whom he governed. Some years after his return he laid the Sicilians under still greater obligation by his successful prosecution to their prætor, Verres, against whom he prepared no fewer than six orations, although the first had the effect of disheartening the accused so effectually that he voluntarily retired into exile. This was Cicero's first great triumph, for Verres had as his counsel and advocate the famous pleader Hortensius, who was at that time the acknowledged head of the Roman bar. In B.C. 69 Cicero filled the office of ædile, and in 66 that of prætor. Supported by Pompeius, whose favor he had gained by his advocacy of the Manilian Law, giving to that general the command of the Mithridatic War, Cicero was at length elected, by an overwhelming majority, to the consulship (B.C. 63). His tenure of office was rendered memorable by the conspiracy of Catiline, which he frustrated with admirable skill and promptitude. (See CATILINE.) The highest praises were showered upon Cicero; he was hailed by Cato and Catullus as the 'father of his country;' and public thanksgivings in his name were voted to the gods. But his popularity did not last long after the expiration of his consulship. His enemies charged him with a public crime in having put the conspiring nobles to death without a formal trial, and he found it necessary to leave Rome, and to take up his residence in Thessalonica (B.C. 58). A formal edict of banishment was pronounced against him, but he was recalled from exile in about sixteen months, and on his return to Rome was received with great enthusiasm.

His recovered dignity, however, soon excited the envy of the very party in the Senate with which he had desired to make common cause; while Pompeius and Cæsar, the greatest powers in the State, from whose enmity he had most to dread, courted his alliance and coöperation. Thus, while preserving an appearance of independence, he was betrayed into many actions which he could not but regard as humiliating, and which, by increasing the power of the triumvirs, led indirectly to the ruin of the Republic. A remarkable exception to this trimming policy is to be found in his assisting Milo when suing for the consulship. Against the wish of Pompeius, and in spite of the hostile feeling of the populace, he defended him after he had slain the demagogue Clodius in an accidental encounter. During this period he composed his works, *De Oratore*, *De Republica*, and *De Legibus*. After a year's admirable administration of the Province of Cilicia (B.C. 51 to 50), he returned to Italy on the eve of the Civil War. With the convictions which he avowed, there was but one course which it would have been honorable for him to pursue—to enlist himself, at all hazards, on the side of Pompeius and the Republic. But instead of this he hesitated, balanced the claims of duty and of interest, blamed Pompeius for his want of preparation, and criticised the plan of his campaign, even after he had joined the army of the Senate, so that Pompeius found his coöperation more annoying than his opposition. After the battle of Pharsalia had wrecked the Pompeian cause, Cicero abruptly quitted his friends, and resolved to throw himself upon the generosity of the conqueror. After nine months' miserable suspense at Brundisium, he was kindly received by Cæsar, whom he followed to Rome. During the years which ensued he remained in comparative retirement, composing his principal works in philosophy and rhetoric, including those entitled *Orator*; *Hortensius*; *De Finibus*; *Tusculanæ Disputationes*; *De Natura Deorum*; *De Senectute*; *De Amicitia*; and *De Officiis*. On the death of Cæsar, he was disposed to unite his interests with those of Brutus and the other conspirators, but was restrained by dictates of prudence. In the civil disturbances which followed, he espoused the cause of Octavianus, and composed his denunciatory orations against Antonius, which are known as the Philippics. These orations were the occasion of his death. When Octavianus and Lepidus joined with Antonius in a triumvirate, Cicero was among the proscribed, and his life was relentlessly sought. The soldiers of Antonius overtook him while his attendants were bearing him, now old and in an infirm state of health, from his Formian villa to Caieta, where he intended to embark. He met his death with greater fortitude than he had shown during many of the untoward incidents of his life. Forbidding his attendants to make any resistance, he stretched forward in the litter, and offered his neck to the sword of his executioners. He died in the sixty-fourth year of his age, on December 7, B.C. 43.

As a man, Cicero was high-minded, generous, and possessed at all times of excellent intentions; yet he was lacking in moral courage; he was intensely egoistic and so unstable that he failed to impress his ideas upon those about him. His very sensitiveness and his high-strung, emotional nature, which made him so successful as an orator and as an interpreter of literary themes, were fatal to his ambition as a statesman. He lacked the intense conviction of a man like Cato, and he lacked also the cool, haughty courage and unshaken nerve of Cæsar. He always saw with fatal facility the strength of each side of every question, so that he was continually wavering between one position and another, swayed by the impulses of the moment and utterly devoid of that grim tenacity of purpose which holds fast to the end. This is the reason why, in the stormy times which attended and followed the death of Cæsar, Cicero hesitated and temporized and so miscalculated the attitude and the intentions of the conflicting parties that, in the end, both of them conceived for him an enmity mingled with contempt.

In his oratory, Cicero represents a mean between the Attic simplicity of Demosthenes and the so-called 'Asiatic' floridity of his own former rival, Hortensius. Ancient rhetoricians classified him as belonging to the Rhodian school of eloquence. He had, indeed, all the gifts of nature and of training which go to make the perfect orator—an impressionable nature, a vivid imagination, and a mastery of language such as has never been surpassed. The one defect in Cicero's oratory is the defect that has been already noted in his character, and which may be defined as a lack of sincerity, of genuine conviction, of the ring of truth. This strain of insincerity makes him almost always seem to be the special pleader who praises or denounces, as the case may be, more from a certain sympathetic facility for working up a temporary interest in almost any cause, than from the impelling force of a master mind which takes its stand upon the rock of principle, from which neither self-interest nor flattery nor danger can shake it free. Hence there is nothing in all Cicero's oratorical effort worthy to be set beside the one sublime masterpiece of Demosthenes without appearing by comparison light and hollow and almost trivial. This defect, however, is wholly moral and psychological. On the linguistic side, and viewed simply as a master of language, it is impossible to set Cicero's rank too high. The perfect harmony of his periods, the exquisite choice of his words, the delicate balance of his cadences, whose sound keeps up an ever running accompaniment to sense, and the majestic roll of his wonderful perorations are absolutely without counterpart in Greek, or English, or any other language whatsoever, and they make reasonable and true the judgment of Quintilian, that "Cicero is now less the name of a man than of eloquence itself."

As a man of letters, Cicero has also left to posterity a mighty name. He created a prose style which for richness and refinement has never been surpassed, and which became at once the standard by which all other Latin prose is now tested and compared. He added, indeed, very largely to the vocabulary of his own language, giving currency to striking and picturesque words and phrases which had hitherto not entered into the diction of formal literature, but which were exceedingly expressive, and needed only the authority of a genius like Cicero to gain universal currency. Likewise, when necessary, and especially when paraphrasing in Latin the philosophical writings of the Greeks, he struck out new words to express new ideas, and these newly minted words were so thoroughly in accordance with the analogies of the Latin language as to be at once accepted and approved. Cicero was a facile writer, and he dealt with many subjects in many departments of intellectual interest. Nearly all of his philosophical books were borrowed almost wholly from Greek sources and are therefore entirely unoriginal in matter; but the manner is most attractive and has a lucidity and grace such as the Greek philosophical writers seldom attained. His rhetorical works, written in the dialogue form, are of great value, first as being the production of one who was himself an accomplished rhetorician, and in the second place for the richness of the historical material which Cicero scattered through them with a lavish hand. Among the minor works of Cicero two, a treatise on old age (*De Senectute*) and one on friendship (*De Amicitia*) have always been admired, both for their exquisite charm of style and for their urbane and cultivated tone. Highly important among the Ciceronian remains are four collections of letters written by Cicero to various acquaintances and friends, and numbering in all 774 pieces. These letters were not collected by Cicero himself, nor did he ever intend that they should be published. They represent, therefore, an unstudied, unconscious, spontaneous self-revelation of their author, and they are, besides, an inexhaustible treasure-house of information, often of a very intimate character, concerning Cicero's contemporaries and the political history of his time. This correspondence was preserved and edited by Cicero's amanuensis, Tullius Tiro, and also in part by Cicero's familiar friend, Pomponius Atticus, to whom very many of the letters were addressed. Cicero likewise, in his early years, composed poetry, little of which has survived and none of which was favorably criticised by his own countrymen.

The extant orations of Cicero are fifty-seven in number, of which the most famous are the four against Catiline, the fourteen so-called Philippics against Antony, the oration on behalf of Archias, and two legal orations, one on behalf of L. Murena and the other on behalf of Marcus Cælius. It should be remembered always in reading these orations that they do not represent the actual form in which they were delivered, but that Cicero edited them freely, as Webster edited his famous speech in reply to Hayne. Some of the Ciceronian orations, in fact, were not delivered at all, and this was especially the case with most of the Philippics, which were in reality political tracts or pamphlets. Of the speeches which have been mentioned above, the first oration against Catiline is the most highly wrought and splendidly rhetorical; the one in behalf of Archias is the most graceful, easy, and refined; the two legal orations are the neatest and wittiest; while the second Philippic is the most elaborately violent in the severity and at times the coarseness of its denunciation.

The best complete text edition of Cicero's works is that of Müller (Leipzig, 1878). The best edition of the letters with a commentary is that of Tyrrell and Purser (6 vols., London, 1885-99). The letters are translated by Shuckburgh (London, 1899). There are no good translations into English of the rest of Cicero's works. There is a German lexicon to the philosophical writings (1895) and to the orations (1884), both by Merguet. For an account of Cicero's career, see Middleton, *Life of Cicero* (London, 1741), very old-fashioned and extreme; Forsyth, *Life of Cicero* (London, 1864); Davidson, *Life of Cicero* (New York, 1894); and Boissier, *Cicéron et ses amis* (5th ed., Paris, 1895). An uncritical but interesting book is Trollope, *Life of Cicero* (New York, 1880). For an unfavorable view of Cicero, see Mommsen, *History of Rome*, vol. iv. (New York, 1886), while the strongest plea for Cicero is that of Gerlach (Basel, 1864). On Cicero as a philosopher, consult Levin, *Lectures on the Philosophy of Cicero* (Cambridge, 1871); on his legal merits, Gasquy, *Cicéron jurisconsulte*

(Paris, 1884); on his rhetorical and oratorical gifts, Causeret, *Sur la langue de la rhétorique dans Cicéron* (Paris, 1886); Thiele, *Hermagoras* (Berlin, 1893); and Sears, *History of Oratory* (Chicago, 1896). Regarding the letters of Cicero, consult Nisard, *Notes sur les lettres de Cicéron* (Paris, 1882), and the introduction to Tyrrell and Purser's edition, in vol. i.

CICERO, Quintus Tullius (c.102-43 B.C.). A Roman commander, younger brother of Cicero, the orator. He served as prætor in B.C. 62, and was Governor of Asia for three years. As *legatus*, he accompanied Cæsar to Britain in B.C. 55. He commanded a legion in winter quarters in B.C. 54, and showed skill and courage in defending his camp against vast forces of the Gauls under Ambiorix. In 51 he served as legate to his brother, Marcus Tullius, in Cilicia. After the battle of Pharsalia, in which he had fought on the side of Pompeius, he was proscribed by the triumvirs and put to death by the emissaries of Antonius. Quintus was perhaps the author of the *Commentariolum Petitionis*, a missive addressed to his brother and usually printed with Cicero's letters to him, and of several tragedies, which have been lost. Eighteen lines by him are printed in Bücheler, *Quinti Ciceronis Reliquiæ* (Leipzig, 1869).

CICERONE, sĭs'ē-rō'nē, *It. pron.* chē'chā-rō'nā (It., from *Cicero*, on account of his learning or eloquence). A guide, usually for the purpose of showing the curiosities and works of art in a town to strangers. Ciceroni are of all degrees, from distinguished archæologists, who undertake the office as a favor, to the humble *guide-interprête*.

CICHORIUM, sĭ-kō'rĭ-ŭm. See Chicory.

CICINDELIDÆ, sĭs'ĭn-dĕl'ĭ-dē. See Tiger-Beetles.

CICISBEO, chē'chēs-bā'ō (It., whence Fr. *cicisbée*, *sigisbée*, probably from Fr. *chic*, Sp. *chico*, small + *beau*, It. *bello*, beautiful; i.e. a minor gallant). A name given in Italy to the professed gallant or constant attendant upon a married lady. In the higher ranks of Italian society, it was at one time considered unfashionable for the husband to associate with his wife anywhere except in his own house. In society, or at public places of amusement, the wife was accompanied by her cicisbeo, who attended at her toilet to receive her commands for the day. This custom, which was once universal, and which naturally gave rise to much scandal, has now almost disappeared. Cicisbeo is synonymous with *cavaliere servente*. See Byron's poem *Beppo*.

CICOGNARA, chē'kō-nyä'rä, Leopoldo, Count (1767-1834). An Italian archæologist and art-historian. He was born in Ferrara, studied in Modena and the Academy of San Luca, and became successively ambassador of the Cisalpine Republic to Turin, and a councilor of State. In 1808 he left the Government service and became president of the Academy of Fine Arts in Venice. He traveled extensively and made valuable collections of art-objects and works on art-history. His chief publication is the *Storia della scultura dal suo risorgimento in Italia sino al secolo di Napoleone* (3 vols., 1813-18; 2d ed., 7 vols., 1824), a critical study of remarkable completeness and accuracy, which obtained for him a European reputation. Consult: Becchi, *Elogio di Leopoldo Cicognara* (1834); and Zanetti, *Cenni biografici di Leopoldo Cicognara* (Venice, 1834).

CICONI, chē-kō'nē, Teobaldo (1824-63). An Italian dramatist, born in San Daniele (Friaul). He studied in Padua, and in 1848 participated in the insurrection in Tuscany, Venice, and Rome. Subsequently he became known as a journalist and poet. His comedy *Le pecorelle smarrite* (1857) was his first important popular success. Other dramatic works, such as *Le mosche bianche* and *La rivincita*, confirmed his reputation.

CID, The, or **CID CAMPEADOR**, *Sp. pron.* thēᴅ käm'pā-ä-ᴅōr' (Sp., Lord Conqueror). The name given in histories, traditions, and songs to the most celebrated of Spain's national heroes. There is so much of the mythical in the history of this personage that hypercritical writers, such as Masdea, have doubted his existence; but recent researches, more particularly those of Dozy, and the investigation of newly discovered Arabic sources, have succeeded in separating the historical from the romantic. The following is the result of these inquiries: Rodrigo or Ruy Diaz (Roderic the son of Diego), generally known as Ruy Diaz de Bivar, was descended from one of the proudest families of Castile. His name first appears in a document written in 1064, during the reign of Ferdinand the Great of Leon. Under Sancho II., son of Ferdinand, he became standard-bearer and commander of the royal troops. In a war between the two brothers, Sancho II. and Alfonso VI. of Leon, it was a stratagem of Roderic's—which, according to modern notions, was anything but honorable—that secured the victory of Sancho at Llantada over his brother, who was forced to seek refuge with the Moorish King of Toledo (1071). He appears at this time to have already been called the *Campeador*, a word supposed to answer to our 'champion.'

Upon the assassination of his friend and patron, King Sancho, he required the next heir, Alfonso, to clear himself by oath of any participation in his brother's murder, ere the nobles of Leon and Castile should do homage to him. By this act he incurred the new monarch's enmity; an enmity which, however, the politic King concealed in the hour of danger, and he even consented to Roderic's marriage with his cousin Ximena, daughter of Diego, Duke of Asturias. But when the King thought the services of Roderic no longer necessary to his own safety, he lent a willing ear to the latter's personal enemies, and banished him in 1081. Roderic then joined the Moorish King of Saragossa, in whose service he fought against both Moslems and Christians. It was probably during this exile that he was first called the Cid or Sîd, an Arabic title which means lord. He frequently defeated the King of Aragon and the Count of Barcelona, the latter of whom, Berenguer Ramon II., he took prisoner.

He was again reconciled to the King, but only for a short time, when he was condemned to a second exile. In order to support his family and numerous followers, he now saw himself forced to carry his sword against the Moors, over whom he gained a victory, and established himself as sovereign or lord of Valencia (1094). He retained possession of Valencia five years, during which time he took many neighboring fortresses. He died of grief in 1099, on learning that his relative and comrade in arms, Alvar Fañez, had been vanquished by the Moors, and that the army which he had sent to his assistance had been defeated near Alcira. After the Cid's death, his widow held Valencia till 1102, when she was obliged to capitulate to the Almoravides, and flee to Castile, where she died in 1104. Her remains were placed by those of her lord in the monastery of San Pedro de Cardeña, near Burgos. The Cid had a son, who was slain by the Moors in a battle near Consuegra. He also left behind him two daughters, one of whom was married to the Count of Barcelona, the other to the Infante of Navarre, through whom the kings of Spain claim kindred with "*Mio Cid el Campeador.*" Relics of the 'Blessed Cid,' as he is still called in Spain, such as his sword, shield, banner, and drinking-cup, are still held in great reverence by the populace. The numerous Cid romances that were first published in the Sixteenth Century contain the most romantic improbabilities concerning the life and deeds of the Cid. Consult *Silva de varios romances* (1550), and *Romancero general* (1604). These romances were taken from the ancient *cantares* (national songs) and *poemas*, most of which are entirely lost. The most important of modern works on this subject are: Dozy, *Recherches sur l'histoire politique et littéraire de l'Espagne pendant le moyen âge* (3d ed., Leyden, 1881); Huber, *Geschichte des Cid*, etc. (Bremen, 1829), and Southey, *Chronicle of the Cid* (London, 1808). Consult also Willemaers, *Le Cid* (Brussels, 1873).

CID, Le. A famous tragedy by Pierre Corneille (q.v.).

CID'ARIS. A genus of sea-urchins (q.v.).

CIDER (from OF. *cidre*, from Lat. *sicera*, from Gk. *σίκερα*, *sikera*, from Heb. *shēkār*, strong drink, from *shākar*, to be intoxicated). The fermented juice of apples, which is extensively prepared in Gloucestershire and in other parts of England, in Ireland, in the northern districts of France, and in North America. The apples are first ground or grated in a mill, and the pulp is then made into a cheese by mixing with straw to hold it in shape, or in some cases is placed in forms made of reedgrass. It is then subjected to pressure, and yields a dark-colored sweet liquid. The pomace remaining is sometimes wet and pressed again, yielding an inferior cider. Green or rotten apples should not be used: the former make cider deficient in sugar and turbid from the suspended particles of starch, while rotten fruit is sure to impair the flavor of the cider. Early apples make a much poorer quality of cider than do fall and winter apples, as the latter contain about 2.5 per cent. more of sugar. Fresh cider contains 85 to 88 per cent. of water, 12 to 15 per cent. of total solid matter, consisting mostly of sugar, and a little malic acid, the natural acid of the apple. The 'working' or fermentation of cider, by which alcohol is produced, is due to certain kinds of yeasts, which decompose the sugar into alcohol and carbonic acid, the latter passing into the air. In some countries pure cultures of yeasts are, with advantage, now employed for the fermentation. After the first or main fermentation the clear liquid is racked off into clean casks, which are placed in a cool cellar for the second or still fermentation. An acetic fermentation may take place by which acetic acid is produced and the cider becomes 'hard,' or quite sour, unless properly handled. The fermented cider contains only 2 or 3 per cent. of solids (instead of 12 to 15 per cent. as in the apple-juice), and from 4.5 to 7 per cent. of alcohol. By again racking off the cider, after the second fermentation, and placing it in casks tightly bunged or in closely stoppered bottles, it can be kept for a considerable time without souring.

Cider brandy, or applejack, is a product derived by distillation from fermented cider. It contains very much more alcohol. For cider vinegar, see Vinegar.

CIÉNEGA, sē-ā'nā-gā, *Sp. pron.* thē-. A name used in the Southwest for swamp (q.v.).

CIÉNEGA (lagoon), or San Juan de la Ciénega. A town in the Department of Magdalena, Colombia, at the mouth of a lagoon on the northwest coast, 10 miles south of Santa Marta, with which it is connected by rail. Its inhabitants, estimated at 7000, are chiefly engaged in fisheries.

CIENFUEGOS, thē'ān-fwā'gōs (Sp., hundred fires), or Jagua. A city of Cuba, in the Province of Santa Clara, situated on the southern coast, about 130 miles southeast of Havana (Map: Cuba, E 4). Cienfuegos has one of the finest harbors in the West Indies, and is of considerable commercial importance. The harbor incloses an area of about 6 square leagues, with a depth of 27 feet at the anchorage. The city is well built and has many modern improvements. The streets are wide and straight, and one of the plazas is considered the finest in the island. Cienfuegos is lighted by gas and electricity, and has a good water supply. Its commerce is largely with the United States. The principal exports are sugar and tobacco. Cienfuegos is connected by rail with Havana and a few other important points. The harbor is supposed to have been visited by Columbus during his first voyage. The settlement here was made by refugees from Santo Domingo in 1819, Cienfuegos being one of the youngest cities in Cuba. During the Spanish-American War it was blockaded by Admiral Schley, then in search of Cervera's fleet. Population, in 1899, 30,038.

CIENFUEGOS, Nicasio Alvarez de (1764-1809). A Spanish poet. He was born in Madrid, was educated at Salamanca, and published his first collection of poems in 1798. The editorship of the Government journals *El Mercurio* and *La Gaceta* was granted him, and subsequently he obtained an appointment in the Foreign Office. For participation in the popular demonstration against the French at Madrid on May 2, 1808, he was deported to France, where he died. His dramas are to later taste stilted and ill-contrived. His lyric verse, however, is still read. An edition of his *Obras poéticas* appeared at Paris in 1821 (2 vols.).

CIESZKOWSKI, tsē'ăsh-kŏv'skē, August, Count (1814-94). A Polish philosopher and political economist, born at Sucha, Podlachia, and educated at the University of Berlin. He was one of the founders of the *Biblioteka Warszawska*, and in 1847 settled in Posen, whence he was for years sent as a deputy to the Prussian Chamber of Deputies. He was president of the Society of the Friends of Science in Posen, and repeatedly, but vainly, endeavored to secure the establishment of a university in that city. His works, written in German, French, and Polish, include the following: *Prolegomena zur Historiosophie* (1838); *Gott und Palingenesie* (1842); *Du crédit et de la circulation* (2d ed., 1847); *Ojcze-Nasz* (1848), a philosophical exposition of the Lord's Prayer.

CIEZA, thē-ā'thȧ. A town of Spain, in the Province of Murcia, situated on the left bank of the Segura, 26 miles northwest of Murcia (Map: Spain, E 3). It lies in a fertile region, amid olive-groves, and contains a large number of churches and monasteries. In its vicinity are the ruins of an old Roman fortress. Population, in 1900, 13,590.

CIEZA DE LEÓN, thē-ā'thȧ dȧ lȧ-ōn', PEDRO DE (1518-60). A Spanish soldier and historian, born in Llerena. He accompanied Pizarro, and up to 1552 fought much and traveled widely. He wrote a *Crónica del Perú* (in four parts), a valuable authority on the geography and early history of Peru, as well as on Peruvian civilization under the Incas. Parts I. and II. of his narrative have been translated into English by Sir Clements R. Markham for the Hakluyt Society.

CIGAR, CIGARETTE. See TOBACCO.

CIGARETTE-BEETLE. A small ptinid beetle (*Lasioderma serricorne*), closely related to the death-watch, which attacks stored tobacco. It is a great pest in tobacco warehouses in both Europe and America. See TOBACCO PESTS.

CIGAR-FISH. See SCAD.

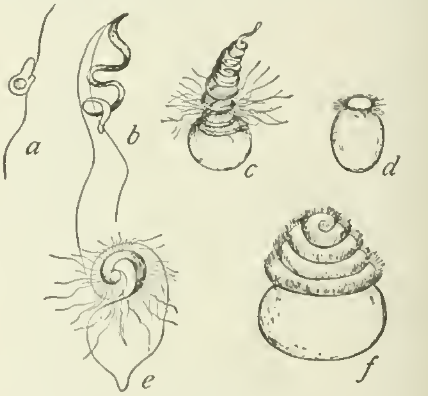
CIGNANI, chē-nyä'nē, CARLO, Count (1628-1719). An Italian painter, born in Bologna. He was the pupil of Francesco Albani, and, in the eyes of many critics, his equal. His first important works were two large paintings in the Palazzo Pubblico, representing "The Entrance of Pope Paul III. into Bologna" and the passage of Francis I. through the city. These were executed under the direction of Cardinal Farnese. But Cignani's masterpiece is the painting of the interior of the dome of the Chapel of the Madonna del Fuoco in the cathedral at Forlì, with the assumption of the Virgin as the subject. This is said to have taken him twenty years. He has been compared to Guido Reni and Carracci; and while he is not really the equal of these artists, his work is always rich in color and satisfactory in design. The women and children in his pictures are particularly charming.

CIGNAROLI, chē'nyä-rō'lē, GIAMBETTINO (1706-70). An Italian painter, born in Verona. He was a pupil of Balestra and Santo Prunati at Verona, and pursued further studies at Venice. His works, including altar-pieces at Pisa, Parma, and Verona, and "Madonna Enthroned, with Saints" (Museum of the Prado, Madrid), place him among the minor Veronese artists. He is better known as the founder of the Academy of Painting at Verona.

CIGOLI, chē-gō'lē, LUDOVICO CARDI DA (1559-1613). An Italian painter and architect. He was born in Cigoli, and was a pupil of Alessandro Allori and of Santo di Titi, but in style imitated Correggio, and is sometimes called the Correggio of Tuscany. He was employed by Pope Paul V. in various works in Rome, and painted for Saint Peter's a fresco which is now destroyed, but which was considered to compare with those of Raphael. Cigoli was painter, sculptor, poet, musician, and architect. He decorated the city of Florence for the marriage of Henry IV. of France and Maria de' Medici. Some of his best works are: "Martyrdom of Saint Stephen," Uffizi Gallery; "Saint Francis," Pitti Gallery; "Flight into Egypt;" "David with the Head of Goliath;" "Tobias;" and "The Marriage of Saint Catharine," in the Hermitage in Saint Petersburg.

CILIA OF PLANTS (Neo-Lat. nom. pl., from Lat. *cilium*, eyelid). The cilia of plant-cells are exceedingly delicate protoplasmic fibrils, whose rapid vibratile movement in the water propels the body. Some of the lowest unicellular algæ are provided with cilia, generally a pair for each cell, throughout the entire vegetative life of the organism. But in the higher algæ and some fungi this motile condition is only present during the reproductive periods, when asexual swarm-spores (zoöspores, q.v.) are to be formed, or motile sex-cells (gametes) are developed. The ciliated cell is represented in groups above the algæ and fungi (thallophytes) only by the motile sperms, characteristic of the mosses and ferns. It makes its last appearance in the cycads and certain other primitive gymnosperms.

Cilia are developed from cytoplasmic elements in the protoplasm (see CELL), and in some types are known to be formed by a definite protoplasmic body termed a 'blepharoplast' (q.v.), which is probably related to the structure generally called a 'centrosphere.'



CILIA.

a, Sperm of Alga; *b*, sperm of Chara; *c*, sperm of Marsilea; *d*, spore of Œdogonium; *e*, sperm of fern; *f*, male cell of cycad.

CILICIA, sĭ-lĭsh'ĭ-ȧ (Lat., from Gk. Κιλικία, *Kilikia*, Assyr. *Khilakku*). An ancient country occupying the southeastern portion of Asia Minor. The Taurus range, which separated it from Cappadocia and Lycaonia, bounded it on the north, the Gulf of Issus and the Cilician Sea (between it and Cyprus) on the south, while the Amanus Mountains and Pamphylia bounded it respectively on the east and west. It was watered by the Pyramus, Sarus, and Calycadnus. The eastern portion of Cilicia was fertile in grain, wine, etc.; while the western and more mountainous portion furnished inexhaustible supplies of timber to the ancients. The passes into Syria are easy of access, but those through the Taurus are very difficult, the easiest being the 'Cilician Gates,' through which Cyrus the Younger and Alexander the Great entered the country. The chief city was Tarsus.

The early inhabitants of Cilicia appear to have been of Semitic stock. At the time of the rise of the Persian monarchy, the country was ruled by the native dynasty of Syennesis. The Cilician princes became vassals of the Persian kings. In the period of Greek rule in the East, Cilicia became the seat of dreaded pirates. Having carried on their depredations too close to the shores of Italy, the Roman arms were turned against them, and they were subdued by Pompeius (B.C. 67), and Cilicia was made a Roman province, though the mountainous western portion was never thoroughly subjugated.

CILICIAN (sĭ-lĭsh′an) **GATES.** The ancient name of a pass through the Taurus from Cappadocia to Cilicia, referred to by Xenophon as exceedingly difficult. The city of Tyana was situated at the northern foot of the Taurus, at the Cappadocian opening of the pass.

CILLI, tsĭl′lē. The capital of a district in Styria, Austria, picturesquely situated amid hilly scenery on the Sann, 38 miles northeast of Leibach (Map: Austria, D 3). The town is of great antiquity, and with the remains of its fortified walls and castle, gabled houses, a Romanesque church, Gothic chapel, and fourteenth-century parish church, retains a mediæval aspect. The municipal museum contains numerous Roman antiquities and relics of the town's early history. It is an increasingly popular summer resort, owing to its warm river baths. Coal and iron mines, smelting furnaces, and chemical works are among its chief industrial establishments, and there is an extensive trade carried on in coal, iron, timber, cereals, cattle, leather, and wine. The Roman Claudia Celeja, mentioned by Pliny the Elder, was taken by the Emperor Claudius B.C. 15, and subsequently formed part of Aquileia. It was the capital of the Slavonian District of Zellia from 1146 to 1331, and from 1339 to 1456 of the county of Cilli. Population, in 1890, 6264; in 1900, 6743.

CIMA, chē′mȧ, Giovanni Battista, called da Conegliano (c.1460-1517). An Italian painter of the Early Renaissance. He is supposed to have been a pupil of Giovanni Bellini, and his pictures have the same religious feeling and serenity. His favorite subject was the 'Madonna,' with saints. Although a serious and conscientious artist, and the best draughtsman of the Bellini school, his work lacks originality, the types being taken from his master's.

CIMABUE, chē′mȧ-bōō′ȧ, Giovanni (c.1240-c.1302). The first great painter of the Revival in Italy. He was born in Florence and belonged to a noble family, but of his studies nothing definite is known. Vasari believes that he learned painting of some Byzantine artists established in Florence. While he certainly felt the Byzantine influence, then paramount in Italy, it has recently been discovered that he resided for a while in Rome (1272), which was the centre of an Italian artistic revival. (See Cosmati.) Cimabue was the first Italian—at least, the first Tuscan—to give individual life, grace, and movement to his figures; to soften the lines of drapery, while maintaining a dignity and religious feeling often absent from the work of his successor, Giotto. Two remarkable pictures in Florence are usually attributed to him, both of them representing the Madonna and Child enthroned, attended by angels: one at Santa Maria Novella, the other in the Belle Arti. Vasari relates that the former excited so much admiration that King Charles of Anjou visited the artist's studio and the picture was carried in triumphal procession to the church. The National Gallery in London has a picture, and the Louvre in Paris has another, attributed credibly to this master; but they are not so important as those in Florence, or as the fifth picture of the same subject (a fresco) in Assisi. It was in his extensive series of frescoes in Saint Francis, Assisi, that Cimabue developed his powers to their fullest, having left behind him his stiff early manner of the Belle Arti work, and even his second Sienese manner of the Santa Maria Novella picture, for the softer and more classic style learned in Rome from such works as the San Clemente and other later frescoes. The Church of Saint Francis was the Mecca of early Italian painters. It is there that we can study the beginning of the Revival: the best Roman, Umbrian, and Tuscan painters of the second half of the thirteenth century covered both the Upper and Lower churches with an unparalleled cycle of religious compositions. Here Cimabue left his best works, in the Upper Church. According to Vasari, Cimabue was Giotto's master; but this, like so many of his statements about early artists, cannot be relied upon. Consult: Strzygowski, *Cimabue und Rom* (Vienna, 1888); Forbes-Robertson, "Cimabue" in *Great Painters of Christendom* (London, 1877).

CIMAROSA, chē′mȧ-rō′zȧ, Domenico (1749-1801). An Italian composer of operas, born as the son of a poor mason, at Aversa, near Naples. He studied music at the Conservatory of Santa Maria di Loreto, under Manna, Sacchini, Fenaroli, and Piccinni. His first opera, *Le stravaganze del conte* (1772), achieved fair success, and in two years he had a reputation in all the leading theatres of Italy, having composed half a dozen operas, and surpassing in popularity all composers then living, Paisiello and Mozart among them. In 1779 his *L'Italiana in Londra* was given in Rome, and other operas followed in rapid succession. He accepted a call to go to Saint Petersburg as composer, and conductor of the Italian opera, but the severe climate compelled him to leave this lucrative post after three years (1789-92). Vienna received him with distinguished honors, and *Il matrimonio segreto*, produced there, had remarkable success. In Naples it had an unprecedented run of sixty-seven nights in 1793. Of the operas written subsequently, the most famous was *Le astuzie feminili* (1794). In 1799 he joined a secret revolutionary society in Naples; the plot was discovered, and Cimarosa was sentenced to death, but this decree was commuted to exile. He died suddenly in Venice, and his friends accused the Government of poisoning him. However, an autopsy proved the allegation unfounded. In all, he wrote about eighty operas, of which number *Il matrimonio* still holds the stage. The greater number are comic operas, which picture the light-heartedness and gayety of life of the last quarter of the eighteenth century. In his serious operas, such as *Gli Orazi e Curiazi* and *Artaserse*, Cimarosa displays some power of characterization, coupled with original orchestral effects, masterly handling of dramatic situations, and tragic force, fully equal to his rich vein of comedy.

CIM'BRI. An ancient warlike tribe, which, with the Teutones (q.v.), were the first Germans that forced their way into the Roman territory. We hear of them first in B.C. 113, when they moved south through the German forests, joined with other northern tribes, and wandered through Noricum and Illyricum. The Romans sent against them the consul Papirius Carbo, but he met with a signal defeat at Noreia, and the road to Italy was left open to the enemy. Fortunately for Rome, the Cimbri chose to migrate to the Rhine, which they crossed, and proceeded southward to Gaul. By the year 109 they were again on the Roman boundaries, and Junius Silanus, who was sent against them, also suffered a defeat. His successors were no more fortunate, and the Romans met with a great disaster at Arausio (Orange) in 105, when they lost no fewer than 80,000 troops. The news of this disaster created a panic in Rome. The Constitution was disregarded, and Marius, the successful general in Africa, was made consul for five years, in the hope that he might crush the 'Gallic' invaders. While he was gathering great forces, the hordes of Cimbri and Teutones poured into northern Italy. The skillful generalship of Marius now put an end to their depredations. The Teutones were crushed at Aquæ Sextiæ (Aix) in Gaul (B.C. 102), and in the following year a fearful battle was fought with the Cimbri in the Campi Raudii, near Vercellæ (Vercelli), and the entire nomad race was annihilated. The men were killed or captured, and the women slew themselves and their children (B.C. 101). The name Cimbric Chersonese was given by the ancients to the peninsula of Jutland.

CIMICIDÆ, sĭ-mĭs'ĭ-dē (Neo-Lat. nom. pl., from Lat. *cimex*, bug). The family of bugs represented by the bedbugs (genus *Cimex*) (q.v.).

CIMICIFUGA, sĭ'mĭ-sĭf'ů-gȧ (Neo-Lat., from Lat. *cimex*, bug + *fugare*, to rout, from *fugere*, to flee), or BUGBANE. An herb of the order Ranunculaceæ. Black snakeroot or black cohosh (*Cimicifuga racemosa*) is found in all the Northern United States, and is much used in rural districts as a medicine, chiefly in the form of a decoction. It contains a crystalline principle, two resins and tannin, and has strong alterative and sedative properties. It is sometimes used in cases of dyspepsia, bronchitis, amenorrhœa, and certain other diseases. The medicinal dose of the officinal extract of cimicifuga is from one to five grains. See Plate of BLOODROOT, under SANGUINARIA.

CIMME'RIANS (Gk. Κιμμέριοι, *Kimmerioi*, from Heb. *Gōmer*, clay, in allusion to their subterranean huts; Assyr. *Gimirrai*, Arm. *Gamir*, Cappadocia). (1) In Homer, a mythical people, living in the far west, on the shores of the ocean, where the sun never shines and perpetual darkness reigns. (2) An historical people, whose country lay along the northern shore of the Black Sea, including the Tauric Chersonese. These latter at an early period made inroads into Asia Minor, and laid waste the country. There were presumably several such incursions, but the accounts are confused. It was probably in the seventh century B.C. that they were driven from their homes by the Scythians and overran Asia Minor. They on this occasion plundered Sardis and destroyed Magnesia, but failed in an attempt on Ephesus, and were finally driven back by Alyattes of Lydia.

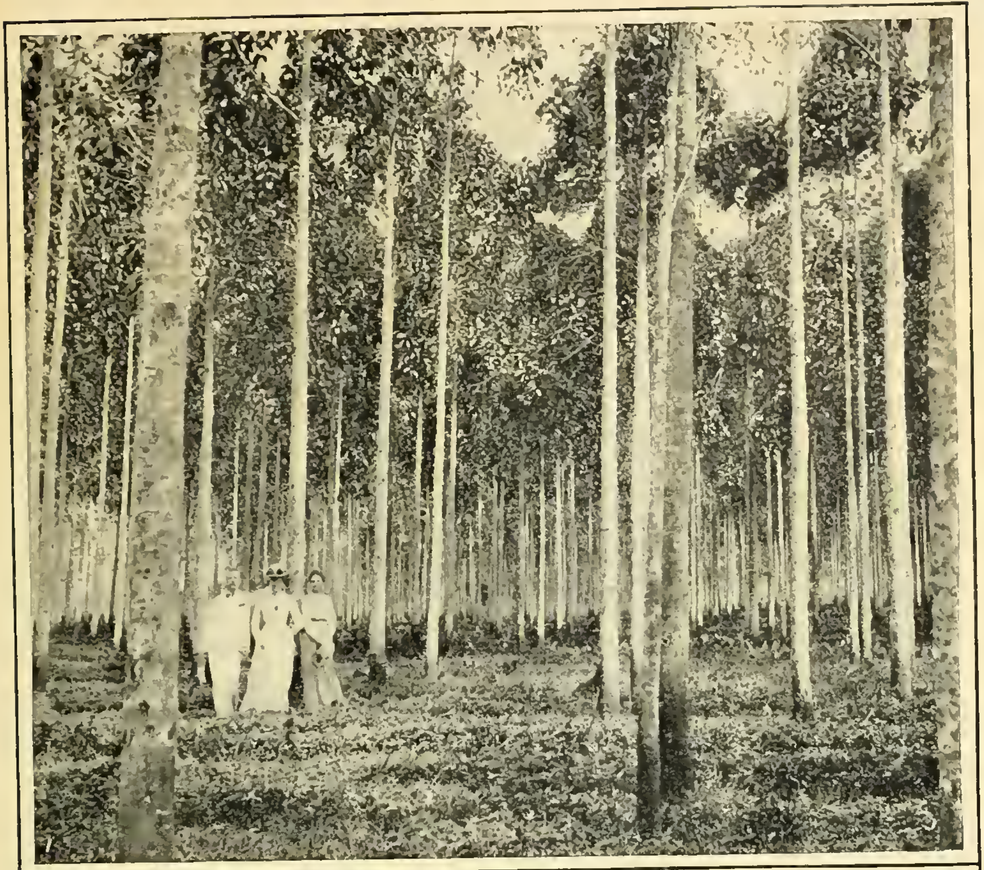
CIMOLITE, sĭm'ô-līt. See FULLER'S EARTH.

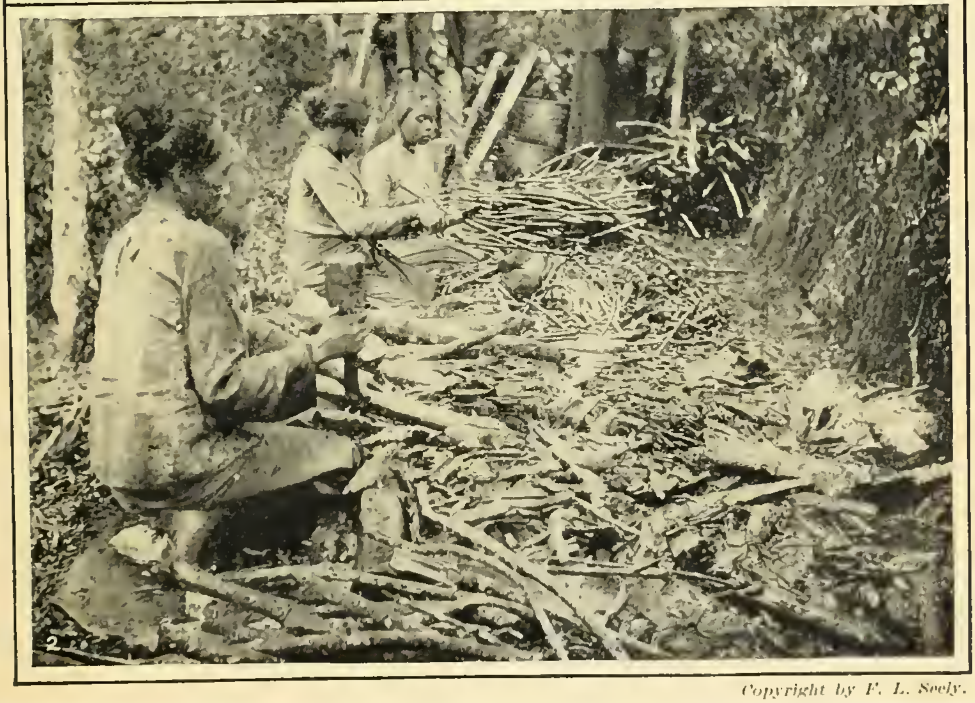
CIMON, sī'mŏn (Lat., from Gk. Κίμων, *Kimōn*) (? -B.C. 449). An Athenian commander, the son of Miltiades, the conqueror at Marathon. In conjunction with Aristides, he was placed over the Athenian contingent to the allied fleet, which, under the supreme command of the Spartan Pausanias, continued the war against the Persians (B.C. 477). He effected the important conquest of Eïon, a town on the river Strymon, then garrisoned by the Persians. Later (c.466 B.C.), when commander-in-chief of the fleet, he encountered a Persian fleet of 350 ships at the river Eurymedon, destroyed or captured 200, and defeated the land forces on the same day. He succeeded likewise in driving the Persians from Thrace, Caria, and Lycia, and expended much of the money which he had obtained by the recovery of his patrimony in Thrace upon the improvement of the city of Athens. At this period he appears to have been the most influential of the Athenians. The hereditary enemy of Persia, he made it his policy to advocate a close alliance with Sparta; and when the Helots revolted, he led an army upon two occasions to the support of the Spartan troops; but on the second occasion, having lost the confidence of his allies, he was ignominiously dismissed. After his return to Athens, his policy was opposed by the democracy, headed by Pericles, who procured his banishment by ostracism. He was recalled in the fifth year of his exile, and was instrumental in obtaining a five years' armistice between the Spartans and the Athenians. He died in the year B.C. 449, while besieging the Persian garrison of Citium in Cyprus.

CINCHONA, sĭn-kō'nȧ (Neo-Lat., prop. *Chinchona*, from the Countess del Chinchón, wife of the Viceroy of Peru). An important genus of trees of the order Rubiaceæ. They yield the bark, so much valued in medicine, known as Peruvian bark, Jesuits' bark, china bark, quina, quinquina, cinchona bark, etc., from which the important alkaloids quinia or quinine (q.v.) and cinchonia or cinchonine (q.v.) are obtained. The properties of the alkaloids are astringent, tonic, antiperiodic, and febrifugal. The species of this genus are sometimes trees of considerable size; but, an after-growth springing from their roots when they have been felled, they often appear only as large shrubs, and some of them in the highest mountain regions in which they are found are low trees with stems only 8 or 10 feet in height. They exist naturally only in South America, between latitudes 20° S. and 10° N., and chiefly on the eastern slope of the second range of the Cordilleras. All the cinchonas, of which there are about fifty species, are evergreen trees, with laurel-like, entire, opposite leaves, stipules which soon fall off, and panicles of flowers which, in general appearance, are not unlike those of lilac or privet. The flowers are white, rose-colored, or purplish, and very fragrant. The calyx is small and five-toothed; the corolla tubular with a salver-shaped five-cleft limb. In the true *cinchona*, the capsule splits from the base upward.

Great difficulty has been found in determining

CINCHONA





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1. CINCHONA TREES.

2. TAKING BARK FROM YOUNG TREE STEMS.

the species by which the different varieties of cinchona bark known in commerce are produced. The common commercial names are derived partly from the color of the barks, and partly from the districts in which they are produced, or the ports where they are shipped. It appears that calisaya bark, also called 'royal' or 'yellow' bark, one of the very best kinds—mostly shipped from Arica, Chile—is chiefly the produce of Cinchona calisaya, a large tree growing in hot mountain valleys of Bolivia and the south of Peru. Other kinds met with in the trade are crown, loxa, or pale bark, derived from Cinchona officinalis and its varieties; red bark, from Cinchona succirubra; Colombia bark, from Cinchona cordifolia; and pale bark from Cinchona nitida and Cinchona micrantha. Yellow bark is also produced by the variety ledgeriana of Cinchona calisaya. The varieties of this and Cinchona succirubra are the ones most met with in cultivation.

In South America the cutting and peeling of cinchona-trees is carried on by Indians, who go in parties, and pursue their occupation during the whole of the dry season. The trees were formerly felled as near the root as possible, that none of the bark might be lost. The bark, being stripped off, is carefully dried: the quilled form of the thinner bark is acquired in drying. The bark is made up into packages of various sizes, but averaging about 150 pounds weight, closely wrapped in woolen cloth, and afterwards in hides, to be conveyed on mules' backs to the towns. These packages are called 'drums' or 'seroons,' and are exported in this form. At present less wasteful methods are employed, and the bark is removed so as not to destroy the trees. Strips of bark are sometimes removed and the wounds covered with moss, thus increasing the total yield.

A number of spurious kinds of Peruvian or cinchona bark are either sent into the market separately, or are employed for adulterating the genuine kinds. They are bitter barks, and have, in greater or less degree, febrifugal properties, but are chemically and medicinally very different from true cinchona bark. They are produced by trees of genera very closely allied to Cinchona. While cinchona-trees have been becoming every year more scarce in their native regions, little attempt has been made to cultivate them there, notwithstanding the constantly increasing demand for the bark: the Dutch have recently made extensive plantations of them in Java, and the same has been done in British India, from seeds and plants obtained from South America by Mr. Clements Markham. Cinchona is also cultivated extensively in Jamaica, Japan, Ceylon, etc. For the cultivation of cinchona a good soil and open subsoil are necessary. It seems to thrive best at a considerable elevation above the sea, where the temperature ranges from 55° to 65° F. It will endure slight frost or a temperature of 100° where shaded. In a wild state, the bark often contains 5 per cent. or less of total alkaloids; but in cultivation, where only part of the bark is removed and the denuded area covered and kept moist, as much as 25 per cent. of alkaloids has been obtained, nearly half of which was genuine.

The Indians of Peru call the cinchona-trees 'kina,' whence are derived the names 'china,' 'quina,' etc. It is not certain that they knew the use of the bark before the arrival of the Spaniards. It is a medicine of great value in the cure of intermittent fevers (q.v.), etc., and diseases attended with much febrile debility; also in certain forms of neuralgia (q.v.), and other diseases of the nervous system. It seems to have been first imported into Europe in 1639 by the Countess del Cinchón or Chinchón, the wife of the Viceroy of Peru, who had been cured of an obstinate intermittent fever by means of it. The Jesuit missionaries afterwards carried it to Rome, and distributed it through their several stations, and thus it acquired the name of 'Jesuits' bark.' Cardinal Juan de Lugo having been particularly active in recommending and distributing it, it was also known as 'Cardinal de Lugo's powder.' It attained great celebrity in Spain and Italy, being sold at high prices by the Jesuits, by whom it was lauded as an infallible remedy. Its mode of action not being well understood, and the cases to which it was applicable not well defined, it seems, in the first instance, to have been employed without due discrimination, and to have fallen very much into the hands of empirics. Falling into disuse in Europe, it was again brought into notice by Sir Robert Talbor, or Talbot, an Englishman, who brought it to England in 1671, and acquired great celebrity through the cure of intermittent fevers by means of it, and from whom Louis XIV. purchased his secret in 1682. A pound of bark at that time cost 100 louis d'or. Talbor seems to have had the acuteness to discern and systematically to avail himself of the healing virtues of the neglected Jesuits' bark, which he mixed with other substances, so as to conceal its taste and odor. Soon afterwards, both Morton and Sydenham, the most celebrated English physicians of their time, adopted the new remedy; and its use, from this period, gradually extended, both in England and France. As it came into general use, it became a most important article of export from Peru; but for a long time the value of the bark to be procured in New Granada remained unknown, and in order to maintain a commercial monopoly, extraordinary methods were employed to prevent it from becoming known at a comparatively recent period of Spanish rule in America. The discovery of the alkaloids on which its properties chiefly depend was made early in the nineteenth century.

The chief active principles are the alkaloids, quinine, cinchonine (qq.v.), quinidine, cinchonidine, and quinamine. The relative proportion of the different alkaloids varies widely with the kind of bark and its age when taken from the tree. Some species produce a large amount of quinine and little of other alkaloids, and vice versa. Cinchona bark itself has in later times fallen into comparative disuse, owing to the discovery of the alkaloid quinine, which is now extensively in use in medicine in the form of sulphate or disulphate of quinine, and is given in doses of from 1 to 20 grains in almost all the cases to which the bark was supposed to be applicable. For notes on the production, cultivation, etc., of cinchona, consult: Mueller, *Extra-Tropical Plants* (Melbourne, 1895); Markham, *Peruvian Bark* (London, 1880); King, *Manual of Cinchona Cultivation in India* (Calcutta, 1876); Lambert, *Description of the Genus Cin-*

chona (London, 1897); Kuntze, *Chinchona: Monographische Studie* (Leipzig, 1878).

CINCHONIDINE, sĭn-kŏn′ĭ-dĭn. See CINCHONINE.

CINCHONINE, sĭn′kō-nĭn (from Neo-Lat. *cinchona*), $C_{19}H_{22}N_2O$. An alkaloid occurring in cinchona bark along with quinine, and having much the same, though by far less powerful, physiological effects as quinine. It is a white crystalline substance, having neither odor nor taste, but leaving a bitter after-taste in the mouth. It is insoluble in water, and but sparingly soluble in alcohol, ether, or chloroform. The sulphate of cinchonine, $(C_{19}H_{22}N_2O)_2H_2SO_4 + 2H_2O$, is a crystalline substance with a strong bitter taste, and is moderately soluble in water, alcohol, and chloroform.

The alkaloid cinchonidine, occurring together with cinchonine, has the same chemical composition as the latter, though a much more pronounced physiological effect. It differs from cinchonine in certain of its physical properties, and its sulphate, $(C_{19}H_{22}N_2O)_2H_2SO_4 + 3H_2O$, is much less soluble in alcohol, and practically insoluble in chloroform. See ALKALOIDS.

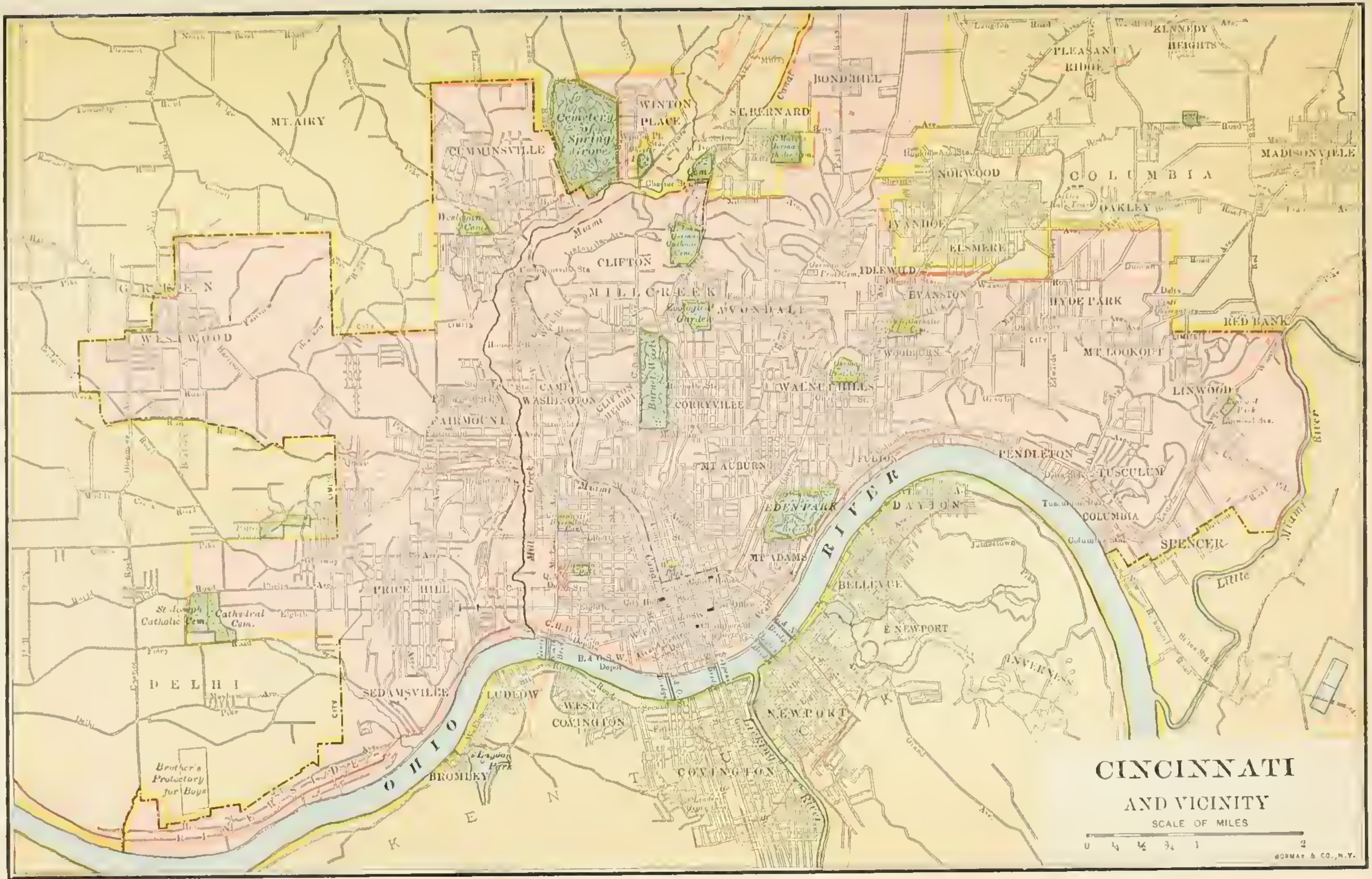
CINCINNATI, sĭn′sĭn-nä′tĭ. The capital of Hamilton County, Ohio; second city in the State, and tenth in the United States in population, on the right bank of the Ohio River, in latitude 39° 6′ 30″ N. and longitude 84° 26′ W. (Map: Ohio, A 7). It lies 116 miles southwest of Columbus, 270 miles southeast of Chicago, and 764 miles from New York, and 1210 miles from New Orleans.

The city is built upon two plateaus, surrounded by a semicircle of hills which approach close to the river above and below the inclosed plain, the ends of the semicircle being only two and a half miles apart. The first plateau is 65 feet above low-water mark, and rises on the north side 400 feet above the Ohio River, which forms here a grand curve from east to west; the second is elevated 50 to 100 feet higher, some points reaching an elevation of 900 feet above sea-level. The summits of the hills—Mount Adams, Mount Auburn, Fairview Heights, Price's Hill, and College Hill—accessible by roads and by inclined plane railways, command superb views of the river, of the Kentucky shore, and of the rolling country surrounding the city. Pierced by ravines, these thickly wooded highlands give a picturesque aspect to the city, and are covered with the beautiful residences of wealthy citizens; the Clifton, Avondale, and East Walnut Hills districts being especially noteworthy for their scenic beauty and magnificent homes. The climate is very favorable. The average temperature in summer is 75.24°; in winter, 34.28°; the yearly mean being 54.72°.

Cincinnati covers an area of 38 square miles, and has a river-frontage extending nearly 14 miles. The brick and the freestone found near at hand, and the blue limestone quarried within the city limits, are largely used for building material. The streets and avenues, averaging 66 feet in width, cross each other at right angles in the old portion of the city, and conform to the surface conditions in the new. A public landing or levee extends along Front Street, the sloping shore being paved and lined with floating docks and wharf-boats. As three terraces constituting the ascent rise one above another from the river-level, the streets become more irregular, and the buildings with extensive grounds spread out. The lowest or 'bottom' streets, sometimes inundated by unusual floods of the Ohio River, are mainly devoted to manufacturing and wholesale trades; they also contain the few remaining slum quarters. The central and business portion of the city, with numerous fine stores, is compactly built, almost the whole plain being filled up, several former villages, of which Cumminsville was the most important, having been absorbed by the extending city. There are more than twenty street-railway lines, all of which converge at and encircle Fountain Square—mentioned below—as a common starting and terminal point. The city has 386 miles of paved and 224 miles of unpaved streets, 93 miles being of macadam, 70 miles of cobble-stones, 47 miles of granite and Belgian blocks, and 23 miles of asphalt. There are 220 miles of sewers, and the street railways aggregate 206 miles.

Beautiful suburban villages cluster about Cincinnati, and are rendered easily accessible by the street railroads. Covington, Newport, Dayton, Ludlow, Bellevue, Linwood, Mount Lookout, Norwood, Oakley (with its well-known race-course), and Riverside are some of these near-by towns. Their dwellings are large and costly, and are surrounded by ample grounds. Fort Thomas, a picturesque hill-station behind Newport, Ky., and one of the most important depots of the United States Army, is forty minutes distant by electric car. The large wire suspension bridge across the Ohio, completed in 1867, at a cost of $1,800,000, connects with Covington, Ky. It is 2252 feet long, with a span of 1057 feet, and 106 feet above low-water mark. Two bridges of wrought iron, resting upon stone piers, connect Cincinnati with Newport, Ky. A fourth bridge, uniting the city with Ludlow, Ky., is that of the Cincinnati Southern Railroad. It cost $3,348,675, and has one of the longest truss spans in the world. A fifth bridge, the Chesapeake and Ohio, connecting Cincinnati with West Covington, is a cantilever. Two unimportant ferries also connect Cincinnati with Covington and Ludlow.

BUILDINGS. Among the fine and substantial edifices may be mentioned the United States Government Building, which contains the Post-Office, Custom-House, court-rooms, and various offices, erected at a cost of $5,000,000. It is of sawed freestone, three stories high, in the Roman-Corinthian style. The City Hall is equally fine, and much larger. The County Court-House, with the jail, occupies a whole square; it is built in the Romanesque style, and is nearly fire-proof. The City Hospital, consisting of eight distinct buildings arranged around a central court, occupies a square of nearly four acres and accommodates 700 patients. The Chamber of Commerce, Masonic Temple, and Odd Fellows' Hall are grand and massive buildings. The City Workhouse has cells for 700 prisoners, with workshops and grounds for their employment. Longview Asylum for the Insane, at Carthage, 10 miles from the city, is of brick, in the Italian Renaissance style. Saint Peter's Roman Catholic Cathedral is an immense structure, in the Grecian style, with a stone spire 224 feet high. The altar-piece is Murillo's original "Saint Peter Delivered." Saint Paul's Methodist Episcopal Church, the First and Second Presbyterian churches, Saint Paul's Protestant Episcopal Pro-Cathedral, the Jewish Synagogue,



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and Saint Francis de Sales Catholic Church, on Walnut Hills, are all worthy of note. The First Presbyterian tower with spire, 285 feet in height, capped by a colossal gilded hand 'heavenward pointing,' is a prominent feature as viewed from the river. It is now somewhat dwarfed by a neighboring 'sky-scraper' of twenty-one stories, one of few edifices of its kind in Cincinnati. Cincinnati is the seat of a Roman Catholic Archbishop and of a Protestant Episcopal Bishop, and contains over 200 churches. The buildings of the municipal markets are valued at over $100,000.

Parks. The several fine parks, well wooded and picturesque, cover an area of 540 acres. The famous Eden Park, or 'Garden of Eden,' on Mount Adams, has 216 acres inclosed, and contains the Art Museum and Art School. The Elsinore Gateway is a striking mediæval reproduction; and from the lofty water-tower, a prominent object, the finest view of the surrounding country is obtained. The chief reservoir of the city's water-works in the park is a fine, ornamental sheet of water. Burnet Woods, another delightful park, embraces 60 acres. The Zoölogical Garden, containing 60 acres of hills, valleys, and ravines, is well stocked with wild animals of all kinds. There are 26 cemeteries; Spring Grove, the best known, has 600 acres of land, lies six miles from the city, and is approached by an avenue 100 feet wide. Among its costly monuments are the Dexter, Fleischmann, and Robinson mausoleums, and a bronze statue commemorating the soldiers who died in the Civil War. The most noted piece of ornamentation in the city is the Tyler-Davidson Fountain, on the Esplanade of Fountain Square, Fifth Street. It was cast at the Royal Foundry in Munich, and cost $200,000. The Garfield statue, at Eighth and Race streets, and the equestrian statue of Gen. W. H. Harrison, first Governor of Ohio, at Eighth and Vine streets, are works of great merit.

Institutions. The educational advantages of the city are unsurpassed. There are several high schools, and many public schools and intermediate schools. The higher institutions include a normal school; the University of Cincinnati, an outgrowth of McMicken University, with collegiate buildings in Burnet Woods Park and an astronomical department with an observatory at Mount Lookout; Wesleyan Female College; a Hebrew Union College; Saint Joseph's and Saint Xavier's Jesuit colleges; the Lane Theological Seminary, at Walnut Hills; the Franklin School; the Hughes and Woodward high schools; several medical, musical, and commercial colleges; and colleges of law, pharmacy, and dentistry.

The Ohio Mechanics' Institute is a strong factor in the education of the masses. It has many pupils, who attend the day and night schools, where they are instructed in literature, science, and mathematics. The Museum and Art School in Eden Park, founded by the ladies of Cincinnati, has two large buildings, modeled after the South Kensington Museum of England. The Museum contains a fine collection of paintings, statues, and works of art; and the school is attended by hundreds of students. There are many libraries, including the Young Men's Mercantile; the Law; the Historical; the Mechanics; and the Public Library. The last is situated in a commodious building on Vine Street, is well equipped, containing over 300,000 works, with numerous reading and circulating branches in outlying districts. The Cuvier Club and the Museum of the Historical and Philosophical Society, poorly housed on East Broadway, have fine collections which are open to the public. The latter is rich in relics of aboriginal mound-dwellers, discovered in the vicinity, and especially at Madisonville.

Besides the public charities already mentioned, there are numerous benevolent institutions, embracing almost every conceivable need, and supported by private munificence.

Hotels, Theatres, and Pleasure Resorts. The chief hotels are the Grand, Saint Nicholas, Burnet House, Gibson House, Emery (with a fine commercial arcade), Palace, Honing, and the Dennison. There are several good clubs; the Avondale Club House, with its well laid-out grounds, is an elaborate suburban establishment of world-wide fame. Among the buildings devoted to amusement, the splendid Music Hall, founded and mainly endowed by Reuben Springer, is justly celebrated. It is used also as an exposition building. It is 300 by 500 feet, will seat 5400 persons, and has one of the largest organs in the United States. Pike's Opera House, the Grand Opera House, Walnut Street Theatre, Columbia Theatre, College Hall, Greenwood Hall, the Lyceum, Arbeiter Hall, Turner Hall, Houck's Opera House, and Robinson's Opera House are also noteworthy structures. Owing to the large number of German residents, the city has become noted for its musical societies, while it is also taking rank as a literary and art centre. The annual musical festivals are distinctive features of its art-life. 'Over the Rhine' is the designation of that part of the city which lies between the canal and the hills, is inhabited almost exclusively by Germans, and is famous for its concert and beer gardens. The elaborately installed summer pleasure resorts include Coney Island, 10 miles up the river, reached by hourly excursion steamers; the Lagoon, on the Kentucky side; and Chester Park, near Spring Grove Cemetery.

Industries and Transportation. The commanding position of Cincinnati permits of admirable commercial relations with the Mississippi and Ohio valleys. Mill Creek and the Miami and Erie Canal, connecting with Lake Erie, are excellent waterways for the steamboats and barges that bring the coal and iron and lumber from the Alleghanies and the produce of the South to the shores of the 'Queen City.' The commerce by water has diminished since the advent of railroads; but, owing to its cheap charges, it is still considerable. Local companies control much of the trade of the 1000 miles of the Ohio River and 200 miles of the tributary streams; and there is periodical communication with Louisville and with New Orleans. Cincinnati is an important railroad centre. The imposing Central Union Depot on Central Avenue and Third Street is a converging station for the Cleveland, Cincinnati, Chicago and Saint Louis; the Baltimore and Ohio; the Chesapeake and Ohio; the Queen and Crescent; the Louisville and Nashville; and other lines. The Cincinnati, Hamilton and Dayton, the Pennsylvania, and some minor local railways have separate stations.

The city has nearly 8000 industrial establishments. Among the leading manufactures are those of men's factory clothing, distilled liquors, malt liquors, foundry and machine-shop products, carriages and wagons, boots and shoes, furniture, tobacco and cigars, soaps and candles. Slaughtering and pork-packing are carried on extensively, the last-named having been formerly the chief industry. Other products comprise all kinds of tanned and curried leather goods, wirework, scales and balances, brick and tile, bridges, cutlery, hosiery and cotton goods, cheese and butter, compressed yeast, biscuits, brooms, brushes, articles representing the wood-turning and wood-carving industries, etc. The Rookwood Pottery, on the crest of Mount Adams, a prominent structure in an Elizabethan style of architecture, produces purely American wares of high artistic merit, which are widely known.

Government. The city government is conducted upon the federal plan. The City Council consists of a Board of Legislation, composed of 31 members — one from each municipal ward. The Mayor, elected triennially, appoints a non-partisan Board of Elections and a Board of Supervisors—each of four members. The City Clerk and his assistant are selected by the Board of Legislation. The City Auditor, Treasurer, Corporation Counsel, Police Court Judge, Police Court Clerk, the Board of Legislation—already mentioned—the Board of Education, and the Board of Public Service, are elected by the people. The last board, consisting of four members, controls the street-cleaning, health, water, and engineering departments, the parks, markets, infirmary, charities, and the city's administrative affairs in general. The School Board comprises 31 members—one from each ward—elected for three years. This board also controls the Public Library. The Police Department is governed by a non-partisan Board of four Police Commissioners appointed by the Governor, and the Fire Department by a Board of four Fire Trustees, appointed by the Mayor. The waterworks, built and owned by the city since 1839, cost $12,775,000, and have 394 miles of mains. Water is pumped from the Ohio into reservoirs in Eden Park.

The municipal income for the fiscal year of 1901 was $6,985,526. The expenditures for maintenance and operation amounted to over $6,000,000. The principal items included: Schools, about $1,050,000, of which $110,000 is devoted to the University; police department, $600,000; fire department, $495,000; waterworks, $475,000; municipal lighting, $340,000; hospitals, asylums, charities, $210,000; street-cleaning and sprinkling, $200,000; other street expenditures, $100,000.

The population, in 1810, was 2540; in 1850, 115,435; in 1870, 216,239; in 1880, 255,139; in 1890, 296,908; and in 1900 it was 325,902, of which number 57,961 were foreign-born whites and 14,500 were colored. The apparently slow increase of population during the last decade is due to the introduction of the electric street railways, which, enabling workmen to live in suburban towns, has swelled the population of these districts at the expense of the mother city.

History. On his way to attack the Indians at Chillicothe, in 1780, George Rogers Clark stopped here, and erected two small blockhouses, which, however, were soon abandoned. The permanent settlement dates from 1788, when a company from New Jersey and Kentucky settled on part of the land bought from the Government in the same year by John Cleves Symmes (q.v.). The village, which, early in the following year, was laid out by Col. Israel Ludlow, was pedantically called 'Losantiville'—a hybrid word, signifying 'the city opposite the mouth of the Licking.' In June, 1789, Fort Washington was built here, and in 1790 the little village was made the capital of the newly erected Hamilton County, and was renamed 'Cincinnati' by General St. Clair, in honor of the Society of the Cincinnati. For some years it was only a straggling village, inhabited for the most part by typical frontiersmen, and in 1800 it had a population of but 750. In 1802 it was incorporated as a town; and in 1819, with a population of about 7500, it became a city. The opening of steamboat navigation on the Ohio in 1816, the completion of the Miami Canal in 1830, and of the first section of the Little Miami Railroad in 1843, with the gradual establishment of manufactures, coupled with the advantageous situation for purposes of trade—all tended to make the growth of the city very rapid. Between 1845 and 1860 German immigrants came in considerable numbers. Cincinnati's close commercial and social relations with the South led its citizens for the most part to oppose all anti-slavery agitation, and the *Philanthropist* press, established by James G. Birney, was destroyed by mobs in 1836, on the ground that the city's trade with the South could not be maintained if Abolitionist papers were tolerated. Cincinnati was, however, the rendezvous for fugitive slaves escaping to Canada, and during the Civil War its sympathies were predominantly with the North. In 1862, during the so-called 'siege of Cincinnati,' the city was threatened by a Confederate force under Gen. Kirby Smith, and for a time was put under martial law. Cincinnati has suffered severely from floods, the most destructive of which occurred in 1832, when the lower part of the city was submerged; in 1883, when more than 150 business houses were inundated; and in 1884, when much property was destroyed and many people rendered destitute. In 1884 (March 28-31) occurred the famous 'Cincinnati Riot.' A mob, infuriated by the lax administration of the law, broke into the jail and attempted to lynch some murderers who had received light sentences from the courts; but, being frustrated, they burned the courthouse and other buildings. The State militia was called out; but before order could be restored, 45 persons had been killed and 148 wounded.

Bibliography. Clark, *Prehistoric Remains of Cincinnati* (Cincinnati, 1876); Miller, *Cincinnati's Beginnings* (Cincinnati, 1880); Ford, *History of Cincinnati* (Cleveland, 1881); *History of Cincinnati and Hamilton County* (Cincinnati, 1894); Emery, *Thirty-five Years Among the Poor and the Public Institutions of Cincinnati* (Cincinnati, 1887); Wilby, "Municipal Condition of Cincinnati," in *Proceedings Second National Conference for Good City Government* (Philadelphia, 1895); Trollope, *Domestic Manners of the Americans* (London, 1831; new ed., New York, 1901); Woodward, "An Object Lesson of Inefficient Administration of Public Funds," in *Public Policy* (Philadelphia, 1901); Ailes, "Cin-

cinnati," in *Historic Towns of the Western States* (New York, 1901).

CINCINNATI, Society of the. An hereditary patriotic society, organized on May 13, 1783, by the American and foreign officers of the Continental Army, assembled in their cantonment on the Hudson River, near Fishkill, N. Y. The original meeting was held in the Verplanck House, then the headquarters of Baron Steuben, where the objects of the society were thus formulated: "To perpetuate as well the remembrance of this vast event [the War of the Revolution] as the mutual friendships which have been formed under the pressure of common danger, and in many instances cemented by the blood of the parties, the officers of the American Army do hereby, in the most solemn manner, associate, constitute, and combine themselves into one society of friends, to endure as long as they shall endure, or any of their closest male posterity, and in failure thereof, the collateral branches who may be deemed worthy of becoming its supporters and members." And as the officers of the Revolution were now returning to their farms, which they had left to fight the battles of the Republic, they named their society the Society of the Cincinnati, after their Roman prototype, Lucius Quinctius Cincinnatus. The emblem chosen was an eagle, on which appears as the principal figure Cincinnatus receiving a sword and other military insignia presented by three Senators, while in the background his wife is standing at the door of their cottage, near which are a plow and other instruments of husbandry. Surrounding this is the motto, *Omnia Relinquit Servare Rempublicam*; on the reverse is shown a sun rising, a city with open gates, and vessels entering the port, and Fame is represented as crowning Cincinnatus with a wreath bearing the inscription, *Virtutis Præmium*; while below are hands joined supporting a heart with the motto, *Esto Perpetua*—the whole suspended from a light-blue ribbon edged with white, suggesting the union of France and America.

Membership was accorded to all Continental officers who had served with honor and resigned after three years' service, or who had been honorably discharged for disability, and in turn to the eldest male posterity of such officers. In failure of direct male descent, the honor passed to male descendants through intervening female descendants, and in failure of all direct descent, the collateral descendants who should be judged worthy of becoming members. The society was organized into thirteen State societies. The first general meeting was held in Philadelphia, on May 7, 1784, at which delegates from the original States were present, and an amended constitution was adopted, under which a society was authorized and organized in France. Although General Washington was the first president of the society and held office until his death, the society was immediately and continuously unpopular throughout the country. Many persons claimed that it was the beginning of an hereditary aristocracy, and others discerned the formation of an armed league to seize all the military and civil offices in the new Republic. Even so conservative a statesman as Benjamin Franklin questioned the society's influence; while John Adams, Samuel Adams, and Thomas Jefferson were avowedly hostile toward it. The Massachusetts Legislature declared the society to be "dangerous to the peace, liberty, and safety of the Union;" and Ædanus Burke, an Irishman who was a judge of the Supreme Court in South Carolina, published a pamphlet under the pseudonym of 'Cassius,' which attained a wide circulation, and in which he endeavored to show that the society was subversive of nearly every principle of human rights for which the War of the Revolution was fought. The fact that many members of the French nobility, who had served with the Americans, including the Marquis de Lafayette, were members of the society, gave some reason for the popular impression against the Cincinnati; and opposition did not cease until after the 'critical period' of American history had passed and the Union was firmly established. One of the most interesting results of the feeling against the society was the founding of Tammany Hall (q.v.) in New York, on the alleged basis of 'pure democracy.' The State Societies of Georgia, North Carolina, Virginia, Delaware, Connecticut, Rhode Island, and New Hampshire soon ceased to exist, and although a temporary interest in the society was revived by the visit of Lafayette to the United States in 1824, still it was not until 1893 that Connecticut, as the first of the revived State societies, was admitted into the general society, and one by one the other State societies were restored, until, at the triennial Convention held in 1902, Georgia, the last of the original thirteen, was provisionally readmitted. The State societies meet annually, and the general society once in every three years. The Presidents-General have been: George Washington, Alexander Hamilton, C. Cotesworth Pinckney, Thomas Pinckney, Aaron Ogden, Morgan Lewis, William Popham, H. A. S. Dearborn, Hamilton Fish, William Wayne, and Winslow Warren. Many of the State societies, such as Delaware, Maryland, Massachusetts, New York, and North Carolina, have published State books, in which is given a history of the society.

CINCINNATI, University of. An educational institution situated in Cincinnati, Ohio. The university was founded on bequests made by Charles McMicken in 1858, and by grants made subsequently by the city of Cincinnati. By Mr. McMicken's will somewhat over $1,000,000 was given the city to found a college; but the State of Louisiana, in which was situated real estate amounting to nearly one-half of the entire bequest, refused to recognize the validity of the will, and the income from the remainder of the estate was insufficient for the desired purpose. The matter, therefore, lapsed until 1870, when an act of the Legislature made it possible to unite the McMicken Fund with the other educational trusts in Cincinnati—notably the Cincinnati College, the Woodward High School, and the Mechanics' Institute. Instruction was first given in 1873, and in 1874 the Academic Department of the university was organized. In 1896 the Medical College of Ohio, founded in 1819, was conveyed to the city, to be reorganized as the Medical Department of the university. In the same year the university organized a law department, and in 1897 this department was consolidated with the Law School of the Cincinnati College, founded in 1833. At present the departments of the university include: The Academic Department, the Graduate Department, the Summer School, the College of Engineering, the Medical Department, the Law Department, the Clinical and Pathological School of the Cincinnati Hospital (affiliated), and the Ohio College of Dental Surgery (affiliated). The total endowment of the university, including buildings, equipment, and all sources of revenue, is about $3,357,000. The library collection numbers approximately 68,000 volumes and 63,000 pamphlets. In 1901 there was a faculty of 164 and a student body of about 1100.

CINCINNATI GROUP. See Ordovician System.

CINCINNATI MUSICAL FESTIVAL. Established by Theodore Thomas in 1873, the festivals have since been held biennially, under his direction. Hitherto the festival had lasted five days—from Tuesday till Saturday, inclusive—within which period there were given seven concerts, five in the evenings and two in the afternoon (Thursday and Saturday); but in 1902 the season was reduced to four days and five concerts. The music is supplied by the Chicago Orchestra (q.v.), augmented for the occasion by a local chorus of about 500 voices, and well-known soloists. The festival has been an invariable artistic success, but has frequently entailed considerable financial sacrifice on the part of those responsible for the undertaking.

CINCINNATO, chên'chê-nä'tô, Romolo (c.1525-c.1600). An Italian painter. He was born in Florence, but the greater part of his life was spent in Spain. He was invited by Philip II. to decorate the Escorial, and painted the cloister in fresco, and several pictures in the church. There are paintings by Cincinnato in the palace of the Duke del Infantado at Guadalajara, and in the Jesuit Church at Cuenca.

CIN'CINNA'TUS, Lucius Quinctius. A hero of the semi-legendary period of Roman history. He was regarded by the later Romans as the model of antique virtue and simple manners. So far as we can discern his character through the veil of legend, Cincinnatus appears to have been an uncompromising patrician. About B.C. 460, he was chosen consul, and two years later was made dictator. The story says that when the messengers from Rome came to tell Cincinnatus of his new dignity, they found him plowing on his small farm. He soon rescued the Consul Lucius Minucius, who had been defeated and surrounded by the Æqui. After a dictatorship of sixteen days, Cincinnatus returned to his small farm on the Tiber. When eighty years old, he was once more made dictator (B.C. 439), and suppressed a threatened plebeian insurrection.

CINCIUS (sĭn'shĭ-ŭs) **AL'IMEN'TUS,** Lucius. A Roman annalist of some note, pretor in Sicily in B.C. 209. He wrote in the Greek tongue a number of works, chief among which is his *Annales*, containing an account of the Second Punic War. During this war he himself was imprisoned by Hannibal, who graciously gave him an account of the Carthaginian march through Gaul and across the Alps. His work was more carefully critical than that of most historical students of his time. Consult Plüss, *De Cinciis Rerum Romanorum Scriptoribus* (Bonn, 1865).

CIN'DEREL'LA (from *cinder*, with dim. termination *-ella*; cf. Fr. *Cendrillon*, and Ger. *Aschenbrödel*, or *Aschenputtel*, of similar meaning). An old fairy tale of Oriental origin. It existed in Egypt in a legend of Rhodopis and Psammetichus. It appears in German lore in the sixteenth century, and is among the fairy-tales of Grimm. Perrault and Madame d'Aunoy popularized it for seventeenth-century France. It deals with the marriage of a household drudge to a prince who discovers her by finding her marvelously small glass slipper, which excites his curiosity as to the owner, and which no Court lady is able to wear. The 'glass' slipper is an error, arising from the confusion of *verre*, glass, with the old *vair*, fur.

CIN'EAS (Lat., from Gk. *Κινέας*, *Kineas*). A Thessalian, the chief adviser of Pyrrhus, King of Epirus. He was a skilled diplomatist, well versed in the art of persuasion, Pyrrhus saying of him that he had won more cities by his words than he had won by his arms. His most famous work was in visiting Rome, to arrange for peace, after the defeat of the Romans in B.C. 280. While in Rome he learned, in a single day, it is said, the name of every man of importance in the city. He was not successful in securing peace, and when he returned he told Pyrrhus that Rome was a temple, and its Senate an assembly of kings.

CIN'EMAT'OGRAPH. See Kinetoscope.

CIN'ERA'RIA (Neo-Lat. nom pl., from Lat. *cinerarius*, ashy, from *cinis*, ashes). A genus of plants belonging to the order Compositæ, and related to Senecio (q.v.), from which the species are separated by some minor characters. As commonly understood, the species are numerous and widely distributed; but as recently limited, there are only about 25 species, all of which are indigenous to South Africa. The other species are mostly grouped with Senecio. The most common garden Cineraria by this classification becomes a Senecio. The plants are annual or perennial herbs, with simple-toothed or sinuate-lobed leaves, and many are notable on account of the ashy appearance of their lower leaves; hence the name (Latin *cinis*, *-cris*, ashes). The Cinerarias are popular greenhouse plants; and on acount of the ease of cultivation, free blooming, and lasting qualities they are much grown. There has been much discussion regarding the species most cultivated, Cineraria cruenta, many strains of which are known. By some it is claimed as a development from the wild species, while others maintain it is a hybrid between Cineraria cruenta and other species, all of which are natives of the Canary Islands. The single-flowered forms are the most popular.

CIN'ERARY URNS. Urns used by the nations of antiquity to contain the ashes of the dead when gathered from the funeral pile. Among the Greeks the urn was buried like a coffin. Among the Romans it was frequently placed in a niche in the family mausoleum or in one of the great columbaria (q.v.). See Burial; Cremation.

CINGALESE, sĭṉ'gȧ-lēz', or Singhalese. See Ceylon.

CINNA, OU LA CLÉMENCE D'AUGUSTE, sē'nȧ, o͞o lȧ klā̂mäɴs' dō̂'gụst'. A tragedy by Pierre Corneille, produced in Paris in 1640, and published in the collected edition of his works, in 1644. It is supposed to be his masterpiece, and deals with the temporary perfidy of a Roman citizen friend to Augustus, who is drawn into a conspiracy against his imperial master by his wife and friends. The conspiracy is discovered, and Augustus pardons the offenders.

CIN'NA, Lucius Cornelius. A Roman noble, one of the principal supporters of the faction of Marius. Sulla, after driving Marius from Rome, and before setting out on his expedition against Mithridates, allowed Cinna to be elected to the consulship. But Cinna had no sooner entered upon that office (B.C. 87) than he impeached Sulla, endeavored to advance the political status of the citizens who had been added to Rome after the Social War, and agitated for the recall of Marius. The events that led to the return of Marius are stated in the article Marius (q.v.). After a cruel massacre of the Roman citizens, in which some of the most eminent statesmen and orators were slain, Marius and Cinna declared themselves consuls. On the death of Marius, which occurred within a few days of his usurpation, Cinna made Valerius Flaccus his colleague for that year, and Papirius Carbo for the two succeeding years. In B.C. 84 he prepared to meet Sulla, who was then on his way from the East to take vengeance upon his enemies, but was slain by his disaffected troops at Brundisium. His daughter Cornelia married Julius Cæsar.

CINNABAR (Lat. *cinnabaris*, from Gk. *κιννάβαρι*, *kinnabari*, vermilion, from Pers. *zinjarf*, Hind. *shangarf*). A name originally applied to the red 'dragon's blood' that came from India, and subsequently to other substances of a similar color, but now exclusively used to designate the mercuric sulphide that crystallizes in the hexagonal system. The Romans were familiar with it, and both Pliny and Vitruvius described the use of an ore of mercury for amalgamating gold. It is found both crystallized and massive, and is bright red to brown in color. Cinnabar is the most important ore of mercury, and is mined in Almaden, Spain; Idria, Carniola, Austria, and at New Almaden and elsewhere in Santa Clara County, Cal. It is also found in Southern Russia, China, Peru, New South Wales, New Zealand, and South Africa. At Sulphur Bank, Cal., and Steamboat Springs, Nev., it is said to be still forming by solfataric action. The native cinnabar is not of sufficient purity to be used directly as a pigment, but the artificial mercuric sulphide constitutes the vermilion (q.v.) of commerce. 'Hepatic cinnabar' is a liver-brown granular or compact variety of cinnabar, which is found at Idria, Austria.

CINNAM'IC (from *cinnamon*) **ACID**, $C_6H_5.CH:CH.COOH$. A chemical compound of carbon, hydrogen, and oxygen. It crystallizes in colorless prisms, which are sparingly soluble in cold water, but dissolve readily in boiling water, alcohol, and ether. It melts at 133° C. and boils with or without decomposition, according to the manner in which it is heated, at about 300° C. It exists naturally in a free state in liquid storax, in the balsams of Tolu and Peru, and in gum benzoin, and is often deposited in large crystals from old samples of oil of cinnamon (cinnamic aldehyde) and from cinnamon-water. It is always formed from oil of cinnamon when the latter is exposed to the action of the air. Cinnamic acid is usually made by heating benzaldehyde with acetic anhydride and dehydrated sodium acetate, its formation taking place according to the following equation:

$$\underset{\text{Benzaldehyde}}{C_6H_5CHO} + \underset{\text{Sodium acetate}}{CH_3COONa} =$$

$$\underset{\text{Cinnamic acid (Sodium salt)}}{C_6H_5CH:CHCOONa} + \underset{\text{Water}}{H_2O}$$

When fused with caustic potash, cinnamic acid breaks up into benzoic and acetic acids. When heated with lime, it splits up into styrolene (a hydrocarbon) and carbonic acid. By the action of nitric acid it may be converted into orthonitro-cinnamic acid, which is related to indigo. Being an unsaturated compound, cinnamic acid readily forms with bromine, hydrochloric, hydrobromic, and hydriodic acids, etc. The substance known as allo-cinnamic acid is stereo-isomeric with cinnamic acid, and may be readily converted into the latter.

CINNAMON. The dried bark of several species of Cinnamomum, belonging to the natural order Laurineæ. The leading species, *Cinnamomum Zeylanicum*, indigenous to Ceylon, where it may be found growing at an altitude of 3000 feet above sea-level, has developed seven or eight well-marked varieties, some of which are ranked by botanists as species. From biblical times the forests supplied the market, but its cultivation was commenced by the Dutch. It is now grown in Brazil, the West Indies, Egypt, the district about Tellicherry (Malabar Coast), and Java, which last two places most nearly approach Ceylon in the quality of their cinnamon; but in none of which, owing to differences of soil, climate, methods of cultivation, or of exposure to sunlight, it produces bark of so high a quality as in its home. Cinnamon plantations are in less favor than formerly, coffee-culture being in the ascendent. In the wild, the tree attains the height of about 30 feet and a diameter of 12 to 18 inches, but when cultivated it is made to form stools of four or five stems. When the bark begins to turn brown, usually in less than two years, these stems, which may be eight feet tall and two inches in diameter at the base, are harvested and replaced by fresh ones. After being stripped of leaves and twigs, which latter yield 'cinnamon chips,' they are girdled transversely and slitted longitudinally, and the bark stripped off with a *mama* or knife similar in form to a nurseryman's budding-knife. The pieces are then laid flat and the outer bark removed by scraping or planing. As the bark dries it forms rolls called quills, the smaller of which are inserted into the larger, which when fully dry are tied in bundles for shipment. Cassia cinnamon, cultivated in India and southeastern China, is the bark of one or more undetermined species, variously named by botanists, *Cinnamomum tamala*, *Cinnamomum iners*, and *Cinnamomum nitidum*. These writers also consider the species mentioned as coarse types of *Cinnamomum Zeylanicum*, formerly introduced into India from Ceylon and modified by mainland environment. Cassia cinnamon, which is exported to America from China and India, is not, as is often supposed, the same as Chinese cinnamon, none of which reaches our ports, because of the steady demand and high prices paid for it in China. The Cassia variety is cultivated; the Chinese is not, but is obtained from old trees growing, not in Chinese forests, but in those of Annam. These trees die, their bark being stripped from trunks and twigs. Saigon cinnamon is derived from an undetermined species of cinnamon which appeared in commerce about 1875 and which has annually increased in importance. Ceylon cinnamon is yellowish-brown, has a peculiar, fragrant odor and sweetish, aromatic, pungent taste. In quality it surpasses the bark obtained from the same species grown in other countries, and also that of the other two species imported into America. Cassia cinnamon is reddish-brown, and has a less delicate taste and odor than the preceding. The Saigon variety, from which the outer bark is not removed, has a gray or grayish-brown exterior, with whitish blotches, warts, and wrinkles. All three kinds contain a volatile oil (oleum cinnamomi), tannin, sugar and mannit, and are recognized in the Pharmacopœia of the United States. The oil, which is given in doses of from one to five drops, is credited with aromatic, stomachic, stimulant, and carminative qualities when taken internally, and with rubefacient properties when applied locally. The bark, due to its tannic acid, has some astringent properties, and is commonly used to flavor astringent powders and mixtures which do not contain iron. From very early times cinnamon has been used as a spice in many culinary preparations. For illus. see plate FLAVORING PLANTS.

CINNAMON-FERN. See OSMUNDA.

CINNAMON-STONE. The yellow variety of grossularite, or calcium aluminum garnet, called *essonite*, or more properly *hessonite*. The best cinnamon-stones come from Ceylon; but specimens of a good quality have been found in Oxford County, Maine, and elsewhere in the United States, some of which would cut into gems of over a carat in weight.

CINO DA PISTOJA, chē'nō dä pēs-tō'yȧ (originally GUITTONCINO SINIBALDI) (1270-1336). An Italian jurist and poet, born at Pistoja. He began the study of law there, and then went to Bologna, where his masters were Lamberto di Ramponi and Franciscus Accursius. On his return, he held a civil position in his native city. Being a partisan of the Ghibelline faction, he became involved in the Guelph and Ghibelline disputes; and as the Guelph faction became triumphant, he had to leave Pistoja, and in the course of his travels visited Rome and journeyed in France. When the death of the Emperor Henry VII. left the Ghibelline cause in an apparently hopeless state, he withdrew from party strife, and made law his special study. He received the degree of doctor at Bologna (1314), and afterwards taught jurisprudence at Treviso, Siena, Florence, Perugia, and Naples. He is the author of two books on law, often reprinted, *Lectura in Codicem Justiniani* (1483) and *Lectura in Digestum Vetus* (1527). Among his pupils were the celebrated Bartolus and Joannes Andreæ. Cino is best remembered now for his friendship with Dante, who speaks of him with enthusiasm in *De Vulgari Eloquio*. Like Dante, he had an ideal lady, to whom he addressed his sonnets—a certain Selvaggia di Vergiolesi; and there is, therefore, significance in his verses comforting Dante on the loss of Beatrice. Petrarch called him 'Nostro Amoroso Messer Cino.' By Carducci he is ranked midway between Cavalcanti and Dante. His works were printed in Rome in 1559. The last edition of his poems is that by Bindi and Fanfani, *Le rime ridotte a miglior lezione* (Pistoja, 1878). Consult: Chiappelli, *Vita e opere giuridiche di Cino da Pistoja* (Turin, 1881); and Rossetti, *Dante and his Circle* (London, 1874).

CINQ-MARS, sȧNk'mär', HENRI COIFFIER RUZÉ D'EFFIAT, Marquis de (1620-42). A French nobleman and conspirator, the favorite of Louis XIII. He was the son of Marquis d'Effiat, marshal of France (1581-1632). Cinq-Mars came to court as a protégé of Richelieu in 1635, receiving a commission in the Royal Guards. In 1637 he became Master of the Robes to the King, and in 1639 was advanced by Richelieu, for political reasons, to the high office of Grand Equerry of France. Cinq-Mars, however, was not content to be Richelieu's tool, and had ambitions of his own. He distinguished himself before Arras in 1640, and desired a high military command. Richelieu would advance him no further and in 1641 Cinq-Mars allied himself with the Orléans faction, and became one of the chief opponents of the Cardinal. In 1642 he accompanied the King to the siege of Narbonne, and seemed high in the royal favor; but Richelieu had unearthed particulars of a conspiracy, in which Cinq-Mars was the chief, which included a treaty with Spain, and after the incriminating documents had been laid before the King, Cinq-Mars and his accomplices were arrested. Gaston d'Orléans saved his own life by confessing and implicating others. Cinq-Mars was imprisoned, tried, and executed with De Thou, at Lyons, September 12, 1642. A romantic novel by Alfred de Vigny, *Cinq-Mars, ou une conjuration sous Louis XIII.*, is founded on the alleged relations between the conspirator and Maria de Gonzaga, afterwards Queen of Poland, and there is an opera by Gounod (1877) based on the story. An English translation of this work has appeared (New York, 1861). For historical accounts, consult: Basserie, *La conjuration de Cinq-Mars*, preface by Alfred Mézières (Paris, 1896); and Bazin, *Histoire de France sous Louis XIII.* (Paris, 1846).

CINQUECENTO, chēn'kwȧ-chĕn'tō. An Italian technical term, which has been borrowed by other languages, meaning 'five hundred,' and used to designate the art, literature, or any other form of culture flourishing between 1500 and 1600. Roughly speaking, it is the 'Developed Renaissance,' 'Hoch-Renaissance,' 'L'Age d'Or,' from Leonardo da Vinci to Paolo Veronese, though its second half was almost everywhere, except in Venice, a period of decadence.

CINQUEFOIL, sĭnk'foil'. See POTENTILLA.

CINQUE (sink) **PORTS** (Fr., five ports). The ancient collective name of the five English Channel ports—Sandwich, Dover, Hythe, Romney, and Hastings—which were enfranchised by Edward the Confessor. William the Conqueror subsequently granted them the privileges of an almost independent State, under command of a Warden, with a court at Dover Castle. Winchelsea and Rye were added later. Up to the reign of Henry VII., their chief function was the supply of the country's naval contingent. In the time of Edward I. they provided fifty-seven fully equipped ships, and frequently extended their powers by equipping piratical expeditions. Dating from the Revolution of 1688, their privileges were gradually abolished, the Lord Warden's jurisdiction ceasing in 1835. The appointment of Lord Warden with residence, and the ancient privilege of carrying the canopy over the sovereign's head at a coronation still exists. The official residence, Walmer Castle, near Deal, dates from the time of Henry VIII. There, as Warden, the Duke of Wellington lived each autumn from 1829, and he there died in 1852. Noteworthy wardens of recent date are Earl Granville, the Right Honorable W. H. Smith, the Marquis of Dufferin, and the Marquis of Salisbury. Consult Burrows, *Cinque Ports* (2d ed., London, 1888).

CINTIO, or **CINTHIO**, chēn′tē̇-ō. See Giraldi, Giovanni Battista.

CINTRA, sēn′trȧ. A small but picturesquely situated town in Portugal, in the Province of Estremadura, about 15 miles west-northwest of Lisbon (Map: Portugal, A 3). It stands on the declivity of the Sierra de Cintra, and contains a palace of Moorish and Christian architecture, anciently occupied by the Moorish kings, and subsequently a favorite residence of the Christian monarchs. A charming view of the town and of the sea is to be had from the top of a hill crowned with the ruins of a Moorish castle. On another hill-top stands La Pena, once a convent, afterwards a residence of the King of Portugal, who restored and gave it the outward appearance of a feudal castle. In the neighborhood, also, is what is called the Cork Convent, named so on account of its cork-lined cells. Cintra is a favorite summer resort with the residents of Lisbon, and contains a summer residence of the King, as well as many private residences. Cintra is celebrated for the convention concluded here, August 22, 1808, between the English and French, by which the latter agreed to evacuate Portugal. Population, in 1890, 4846; 1900, 5918.

CIONE, chê-ō′nȧ, Andrea di. See Orcagna.

CIOTAT, syô′tȧ′, La (Prov. *Cioutat*, from Lat. *civitas*, state, city). A seaport town of France, in the Department of Bouches-du-Rhône, situated on the west shore of a bay in the Mediterranean, about 15 miles southeast of Marseilles, in the midst of olive, orange, and pomegranate plantations (Map: France, M 8). It is well built and has a good and commodious harbor, formed by a mole, and well defended. The industries are chiefly cotton-spinning and ship-building, and there is an active trade in the produce of the district. Population, in 1901, 11,622.

CIPARIU, chê-pä′rĭ, Timoteo (1805-87). A Rumanian ecclesiastic and philologist, born in Transylvania. As professor in the theological seminary of Blasendorf, he founded in 1867 the *Organul Luminarei* ('Organ of Light'), the first Rumanian journal to be printed in Latin characters. He was the most celebrated representative of the Latinist School in Transylvania, and was the author of the following important works: *De Latinitate Linguæ Valachicæ* (1855); *De Nomine Valachorum Gentili* (1857); *De Re Litteraria Valachorum* (1858); *Grammatica Limbei-Romîne* (2 vols., 1859-69). The latter work was honored by a prize from the Rumanian Academy.

CIPHER (from OF. *cifre*, Ger. *Ziffer;* from ML. *cifra*, *zifera*, Ar. *sifr*, *safr*, cipher, from *safara*, to be empty). An ornamental arrangement of the initial letters of a name by which they become also a private mark, adopted by artists and architects as distinctive of their work. That of Albrecht Dürer is well known. That of the American painter Whistler also is well known—a conventionalized yellow butterfly. Any complex arrangement of letters which an individual employs as his signature becomes his own property, and Albrecht Dürer secured an injunction, at one time, against an engraver who made use of his cipher when employed in engraving his works.

CIPHER. See Cryptography; Signaling and Telegraphing, Military.

CIPRIANI, chē′prē̇-ä′nē̇, Giovanni Battista (c.1727-85). An Italian-English painter and etcher. He was born in Florence in 1727 or 1728. He attended the school of Ignatius Hugford, an Englishman settled in Florence, where he was a fellow-pupil of Bartolozzi (q.v.). In later years Cipriani and Bartolozzi worked together in London, and by the union of their respective talents—designing and engraving—produced many works of rare excellence. Cipriani was one of the first members of the Royal Academy at its foundation in 1768. He executed a few large portraits, most of which are at Houghton; he also left a large number of drawings, which are ranked as the most charming efforts of his art. Cipriani died at Hammersmith, December 14, 1785, and was buried in the Chelsea burial-ground, where Bartolozzi erected a monument to his memory.

CIRCASSIA, sĭr-kăsh′ĭ-ȧ. A region of the northwestern Caucasus (q.v.) (Map: Russia, F 6). In its largest sense, as the home of the Kabardians and the Abkhasians, as well as of the Circassians (q.v.), it is bounded by the Kuban River on the north, the country of the Lesghians on the east, Mingrelia on the south, and the Black Sea on the west. Circassia has been nominally a part of Russia since 1829. It was only after a struggle of thirty-five years, however, that Russian sway was fully established.

CIRCASSIANS, sĭr-kăsh′*a*nz, or **TCHERKES′SES.** A term applied in general to the northwestern group of peoples inhabiting the region of the Caucasus, and in particular to the Adighe or Tcherkesses (the first is their own name; the second, from which the word *Circassian* comes, is that by which they are known to the Turks and Russians), the most noteworthy of these tribes. Other Circassian tribes are the Abkhasians on the Black Sea, the Kabardians, Shapsukhs, Abadzeh, etc., all related more closely by language than by race; for all are more or less mixed with Tatar, Asiatic, Aryan, and other intrusive elements. Except the Abkhasians (the difference may be due to artificial lateral compression), the Circassian tribes tend to be brachycephalic, and of average rather than tall stature. The Abkhasians are darker-skinned, and not so well formed or featured as the Circassians proper; and of the latter those of Kuban are the least attractive. The Kabardians, who formerly laid claim to greater purity of blood, are now less pure than some of the Adighe. The Circassians have produced many men and women of great physical beauty, and Circassian girls, famous for their good looks, have long adorned the harems of Turkish sultans, pashas, and men of wealth, refining to no little extent their Mongolian blood—many of them, indeed, being ready enough to change their mountain home for a Turkish or Persian palace. The ethics of the Circassians have always been of a primitive type, and *Cherkess* is said to signify as much as 'brigand'; but over against this may be set their hospitality and brave struggle for liberty against the Russians. When the Russian conquest was completed in 1864, more than 300,000 of them left the Caucasus for various parts of Asiatic and European Turkey, and they are said later to have had a share in the Bulgarian massacres. Those who are still in the old habitat number about 150,000, and are losing more and more of their racial purity. The higher classes of the Circassians have adopted Islam, while among the lower exists a certain kind of Christianity or Islamism in combination with survivals of ancient heathenism. The languages of the Circassian tribes are thought by some authorities to be incorporating rather than agglutinative. Since Neumann's *Russland und die Tscherkessen* (1840), the literature about the Circassians has grown considerably. Especial reference may be made to R. von Erckert's *Der Kaukasus und seine Völker* (Leipzig, 1887), and the fourth volume of Chantre's comprehensive *Recherches anthropologiques dans le Caucase* (Lyons, 1885-87).

CIRCE, sẽr'sē (Lat., from Gk. Κίρκη, *Kirkē*). In Homer, the sister of Æetes, and daughter of Helios and the ocean nymph Perse. She lived in a valley of the island of Ææa, surrounded by human beings whom she had transformed into wolves and lions. Here she transformed into swine the companions of Odysseus, and when the hero came to her palace she sought to exercise the same enchantment upon him. Protected by the magic herb, *moly*, which Hermes had given him, he withstood her sorceries, and forced her to disenchant his followers. He then remained with her a year, and received instruction for avoiding the dangers that still beset his homeward way. A Cyclic epic told of Telegonus, the son of Circe and Odysseus, who, landing in Ithaca, killed his father in battle. Later writers, possibly even Hesiod, placed the island of Circe in the Tyrrhenian Sea, and still later it was identified with the Circean Promontory. In the Alexandrian writers Circe also appears in the story of the Argonauts, and to the same period belongs the story that in jealousy of Scylla, she transformed her rival into a monster, by pouring her magic drugs into the water where Scylla bathed.

CIRCE'I, or **CIRCEII**. A town of ancient Latium, situated on the promontory known as Mons Circeius (Monte Circeo). Though of ancient date, Circei was never very famous, but Tiberius and Domitian had villas there. On the hill, about three miles from the sea, are remains of early walls of polygonal masonry.

CIRCENSIAN (sẽr-sĕn'shan) **GAMES**. See CIRCUS.

CIRCLE (from Lat. *circulus*, dim. of *circus*, Gk. κίρκος, *kirkos*, κρίκος, *krikos*, circle). The locus (q.v.) of all points in a plane at an equal finite distance from a fixed point in that plane. The fixed point is called the centre, and the space inclosed, or, more properly, its measure, the area of the circle. The segment of any straight line intercepted by the circle (AB in Fig. 1) is called a chord. Any chord passing through the centre, O, is called a diameter, as A'B'. The centre bisects any diameter, and the halves are called radii. Any line drawn from an external point cutting the circle, as PQ, is called a secant; and any line which has contact with the circle, but does not intersect it when produced, as B'T, is called a tangent. Any portion of the area limited by two radii, as OA and OB, is called a sector; and any portion of the circle, BA'A, is called an arc. A chord is said to divide the area into segments; the segments are equal if the chord is a diameter. A plane passing through the centre of a sphere cuts the surface in a circle called a great circle of the sphere. Circles of longitude are great circles. Other circles of a sphere are called small circles. Ancient writers usually called the circle, as above defined, a circumference, the word 'circle' being applied to the space inclosed. In modern geometry, at least above the elements, the word 'circumference' is not used, and the word 'circle' applies to the curve.

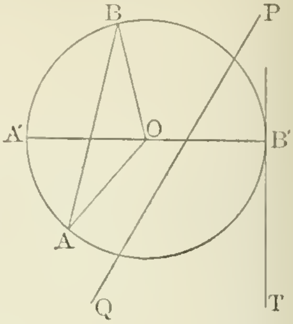


FIG. 1.

In coördinate geometry (see ANALYTIC GEOMETRY), the circle ranks as a curve of the second order (see CURVE), and belongs to the conic sections; the section of a right circular cone, perpendicular to the axis of the cone, being a circle. The Cartesian equation of the circle, taking its centre as the origin, is $x^2 + y^2 = r^2$. The constructions of Euclidean geometry being limited to the use of two instruments, the straight-edge and the compasses, the circle and the straight line are the two basal elements of plane geometry. A few of the leading properties of the circle are:

(1) The ratio of the circumference to the diameter is a constant; this is designated by the symbol π. This ratio is approximately 3.141592; 3.1416 and even $3\frac{1}{7}$ are sufficiently accurate for ordinary purposes; thus the area of a circle of radius 5 inches is 3.1416×5^2 square inches, or 78.54 square inches. The ratio π has an interesting history. The papyrus of Ahmes (q.v.) (before B.C. 1700) contains the value $(\frac{16}{9})^2$ or 3.1605; Archimedes (B.C. 287-212) described it as lying between $3\frac{1}{7}$ and $3\frac{10}{71}$; the Almagest (q.v.) gives it as

$$3 + \frac{8}{60} + \frac{30}{60 \cdot 60} = 3.14166;$$

the Romans often used $3\frac{1}{8}$; Aryabhatta (q.v.) gave 3.1416; Bhaskara (q.v.), 3.14166; and the Chinese of the sixth century A.D., $\frac{22}{7}$. Ludolph van Ceulen (1586) computed π to 35 decimal places, and in recent times it has been carried to over 700 places. In 1794 Legendre proved that π is an irrational number. Furthermore, it is not only incommensurable—that is, not expressible as the quotient of two integers—but it has been proved by Lindemann (1882) to be transcendental. This means that π cannot be a root of an algebraic equation with integral coefficients. Certain irrational (incommensurable) numbers may be represented by elementary geometric lines; e.g. $\sqrt{2}$ is represented by the diagonal of a square of side 1;

but π, being transcendental, cannot be represented by any construction depending solely upon the straight-edge and compasses. It requires a transcendental curve, such as the integraph of Abdank-Abakanowicz.

Thus, through labors like those of Gauss, Hermite, and Lindemann, the true nature of π has been determined, and efforts at circle-squaring by the instruments of elementary geometry have been proved futile. Modern analysis has shown π to be expressible by certain infinite series; e.g.

$$\pi = 4\left(1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} - \dots\right) \text{ (Leibnitz);}$$

or in the form of a continued fraction, as in

$$\pi = \cfrac{4}{1 + \cfrac{1}{2 + \cfrac{9}{2 + \cfrac{25}{2 + \cfrac{49}{2 + \dots}}}}} \qquad \text{(Brouncker)}$$

or of a continued product, as

$$\frac{\pi}{2} = \frac{2 \cdot 2 \cdot 4 \cdot 4 \cdot 6 \cdot 6 \cdot 8 \cdots}{1 \cdot 3 \cdot 3 \cdot 5 \cdot 5 \cdot 7 \cdot 7 \cdots} \text{ (Wallis).}$$

The method of approximating this ratio commonly used before the introduction of calculus (q.v.) consisted in computing the perimeters of the circumscribed and inscribed polygons of a circle of diameter 1. For, since the length of the circumference in this case is the desired ratio, the value of π lies between the values of the perimeters of the given polygons. A history of the development of this important problem of geometry will be found in Rudio, *Archimedes, Huygens, Lambert, Legendre: vier Abhandlungen über die Kreismessung* (Leipzig, 1892).

(2) The centre of the circle is a centre of symmetry, and any diameter is an axis of symmetry (q.v.).

(3) The perimeter of a circle of radius r is $2\pi r$, and its area πr^2. The area is greater than that of any plane figure of the same perimeter.

(4) Concentric circles—that is, those having the same centre—never intersect.

(5) Circles are similar figures (see SIMILARITY), and their areas are proportional to the squares of their radii or diameters.

(6) Arcs of a circle are proportional to the angles subtended at the centre, and conversely. This property forms the basis of angular measure.

CIRCULAR MEASURE. The supposed number of days in the year early led to the division of the circle into 360 equal parts, for use in astronomical instruments. A knowledge of the regular hexagon probably led to the further division of 360 degrees into six parts of 60 degrees each. The Babylonians divided each degree into 60 equal parts, and each subdivision into 60 equal parts, thus producing the sexagesimal scale. (See NOTATION.) Thus the circumference of a circle is divided into 360 equal parts, called degrees; each degree into 60 equal parts, called minutes; and each minute into 60 equal parts, called seconds. Further divisions are better represented by decimal fractions. The circle is also commonly divided into four equal parts of 90 seconds each, called quadrants. By connecting the centre of a circle with the points of equal division on the circumference, equal unit angles are formed, whose magnitude is independent of the length of the radius; thus producing an angle measure, the basis of the protractor (q.v.). For scientific purposes, however, it would be more convenient to divide a quadrant into 100 equal parts, called grades, and each of these into 100 equal parts, called centesimal minutes, and each of these into 100 equal parts, called centesimal seconds. This plan, attempted in France as part of the metric system, is known as the centesimal division of the circle. For example, $3^g\ 45'\ 17''$ (read 3 grades, 45 centesimal minutes, and 17 centesimal seconds) may be written 3.4517. To translate this into sexagesimal notation, 3^g equals $3 \times \frac{90}{100}^\circ = 2.7^\circ$, 45 centesimal minutes $45 \times \frac{90^\circ}{10000} = 0.405'$ or 0.00675°; and so on. The sexagesimal system is, however, so well established that the centesimal has only very recently, in France, come to take important rank.

RADIAN MEASURE. In higher mathematics, especially in analytic trigonometry, another unit of angular measure, called the *radian*, is in general use. This is defined as the angle subtended at the centre of a circle by an arc equal in length to the radius (Fig. 2). The relation of the radian to other angular units is as follows:

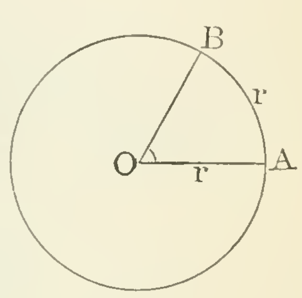


FIG. 2.

$$\frac{\text{The radian AOB}}{\text{4 right angles}} = \frac{\text{arc AB}}{\text{circumference}} = \frac{r}{2\pi r} = \frac{1}{2\pi}.$$

Therefore, the radian equals $\frac{1}{2\pi} \times 4$ right angles $= \frac{2}{\pi} \times 1$ right angle. In degrees one radian is

$$2 \cdot \frac{90^\circ}{\pi} = 57.29^\circ + .$$

or, more nearly,

$$57^\circ\ 17'\ 44.6666'' + .$$

$\frac{\pi}{2}$ radians = a quadrant; π radians = 180°, and 2π radians = 360°.

Since 1 radian $= \frac{180^\circ}{\pi}$, $1^\circ = \frac{\pi \text{ radians}}{180}$ and

$$n^\circ = \frac{n\,\pi}{180} \text{ radians.}$$

The word radian is commonly omitted in discussions of angles; e.g. π radians = 180° is expressed $\pi = 180^\circ$.

A few of the modern theories concerning the circle are suggested by the following:

(1) *Co-axal Circles.*—The radical axis XX, (Fig. 3) of two circles of radii r_1, r_2 is the line perpendicular to their centre line C_1C_2, and dividing this line so that the difference of the squares on the segments equals the difference of the squares on the radii. The common chord of two intersecting circles is a segment of their radical axis. All circles having a common radical axis pass through two real or two imaginary points, and such a group of circles is called a co-axal system. If two circles are concentric, their

radical axis is the line at infinity; therefore, a system of concentric circles passes through two imaginary points at infinity. These are called the circular points. The radical axis of two circles is the locus of points from which tangents to the two circles are equal. If a variable polygon inscribed in a circle of a co-axal system moves so that all the sides but one touch fixed circles of the system, the last side also touches, in every position, a fixed circle of the system (Poncelet's theorem).

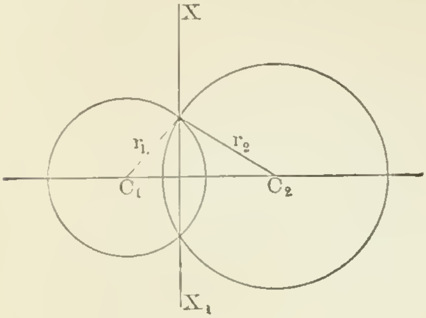


Fig. 3.

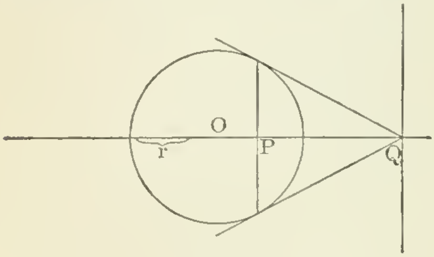


Fig. 4.

(2) *Inversion.*—Let O (Fig. 4) be the centre of a circle of radius r, and P, Q two points on a line through O, such that $OP \cdot OQ = r^2$. P and Q are called inverse points with respect to the circle. Either point is said to be the inverse of the other. The circle and its centre are called the circle and centre of inversion, and r the constant of inversion. If every point of a plane figure be inverted with respect to a circle, or every point of a figure in respect to a sphere, the resulting figure is called the inverse image of the given one. The inverse of a circle is either a straight line or a circle, according as the centre of inversion is or is not on the given circle. The centre of inversion is then the centre of similitude of the original circle and its inverse; and the circle, its inverse, and the circle of inversion are co-axal. The theory of inversion was invented by Stubbs and Ingram in 1842, and has been made use of by Lord Kelvin in several important propositions of mathematical physics.

(3) *Pole and Polar.*—The polar of any point P, with respect to a circle, is the perpendicular to the diameter OP drawn through the inverse point. Hence the polar of a point exterior to a circle is the chord joining the points of contact of the tangents drawn from the external point. Any point P lying on the polar of a point Q′ has its own polar passing through Q′. The polars of any two points, and the line joining the points, form a triangle called the *self-reciprocal* triangle with respect to the circle, the three vertices being the poles of the opposite sides.

(4) *Involution.*—Pairs of inverse points, P, P′; Q, Q′; etc., on the same straight line, form a system in involution, the relation between them being $OP \cdot OP' = OQ \cdot OQ' = \ldots . = r^2$. Here the inverse points are usually called *conjugate points.* Any four points whatever of a system in involution on a straight line have their anharmonic ratio (q.v.) equal to that of their four conjugates.

(5) *Nine-Points Circle.*—The intersection of the three altitudes of a triangle is called the orthocentre. The mid-points of the segments from the orthocentre to the vertices constitute three points, the feet of the altitudes three more, and the mid-points of the sides of the triangle three more—all nine lying on the circumference of a circle, called the *nine-points circle.*

In Fig. 5, O is the orthocentre and K, L, G, D, M, E, H, N, F are the nine points.

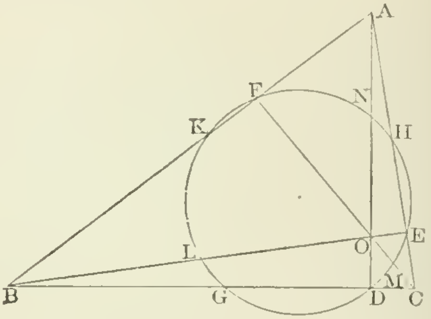


Fig. 5.

(6) *Seven-Points Circle* (Brocard circle). Point S in Fig. 6, so placed that its distances from the sides of the triangle ABC are proportional to the lengths of the respective sides, is called the symmedian point of the triangle. Lines through this point parallel to the sides cut them in six points, D, E′, E, F′, F, D′, which lie on a circle called the triplicate-ratio or Tucker circle. If lines were drawn through A, B, C, parallel to the sides of the triangles DEF, D′E′F′, they would intersect one another and F′E, DE′, FD′ in P, P′, L, M, N. These five points,

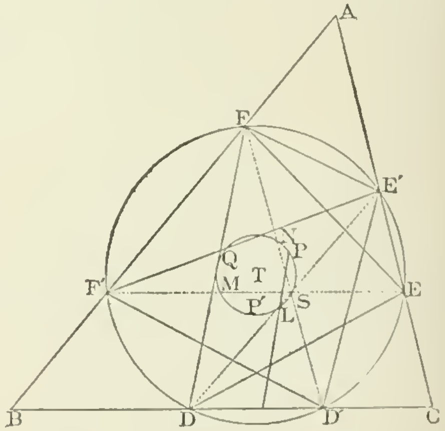


Fig. 6.

together with S and the circumcentre of the triangle, lie on a circle called the seven-points or Brocard circle. P, P′ are called the Brocard points.

Consult: McClelland, *Geometry of the Circle* (London, 1891); Casey, *Sequel to Euclid* (Dublin, 1888); Catalan, *Théorèmes et problèmes de géométrie élémentaire* (Paris, 1870).

CIRCLE, Magic. A space in which sorcerers were wont, according to the ancient popular belief, to protect themselves from the fury of the evil spirits they had raised. This circle was usually formed on a piece of ground from seven to nine feet square, in the midst of some dark forest, in a churchyard, vault, or other lonely and dismal spot. The circle was described at midnight in certain conditions of the moon and weather. Inside the outer circle was another somewhat less, in the centre of which the sorcerer had his seat. The spaces between the circles, as well as between the parallel lines that inclosed the larger one, were filled 'with all the holy names of God,' and a variety of other characters supposed to be potent against the powers of evil. Without the protection of this circle, the magician, it was believed, would have been carried off by the spirits, as he would have been had he by chance got out of the charmed space.

CIRCLE, Meridian. See Meridian Circle.

CIRCLE, Mural. See Mural Circle.

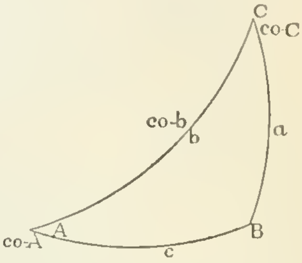
CIRCLEVILLE. A city and the county-seat of Pickaway County, Ohio, 30 miles south of Columbus; on the Scioto River, the Ohio and Erie Canal, and the Cincinnati and Muskingum Valley and the Norfolk and Western railroads (Map: Ohio, E 6). It was laid out in 1810, on the site of a prehistoric circular fortification (described in Howe's *History of Ohio*), from which the name is taken. Pork-packing is an important industry, and there are also extensive manufactures of straw-boards, furniture, farming implements, canned goods, flour, and corn-meal. Settled in 1806, Circleville was incorporated in 1814, and is governed at present under a revised charter of 1852, which provides for a mayor, elected biennially, and a city council. Population, in 1890, 6556; in 1900, 6991.

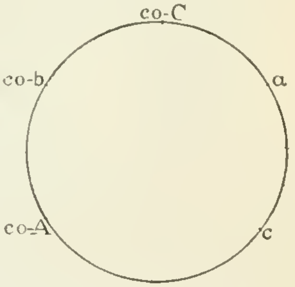
CIRCUIT (Fr. *circuit*, from Lat. *circuitus*, from *circuire*, *circumire*, to go around; from *circum*, around + *ire*, to go). A territorial division, within which a court of justice is to be held, at stated times and places. The practice of dividing England into circuits, and assigning to each division judges whose duty it is to hold court therein at prescribed places and terms, became settled during the reign of Edward I. As early as the first Magna Charta, in 1215, it was provided that certain *assizes* (q.v.) for the recovery of lands should always be taken in the counties in which the lands were situated, and that two justices of the King should be sent to each county four times a year for that purpose. But the evils arising from the remote and irregular sittings of the King's Court (*curia regis*) were not obviated until the end of that century. This early arrangement of circuits has been modified from time to time, and it is now regulated by the Judicature Act of 1875, and an order in council of 1876. In the United States there are two classes of circuits—one belonging to the judicial system of the Federal Government, the other to that of the State. For a description of the several courts designated as circuit courts, see Court.

CIRCULAR NOTES. See Credit, Letters of.

CIRCULAR NUMBERS. Numbers whose powers end with the same figure as do the numbers themselves: e.g. 0, 1, 5, 6, for $0^n=0$, $1^n=1$, 5^n being a multiple of 5, ends in 5, $6^2=36$, $6^3=216$, etc.

CIRCULAR PARTS. The five elements involved in a rule for solving right-angled spherical triangles, formulated by John Napier (q.v.). The five parts, *c*, *a*, complement of *A*, complement of *C*, and complement of *b*, as indicated in the triangle, when arranged on the circumference of a circle, admit of the following selection: Any part, as *co-C*, has two adjacent parts, as *co-b*, *a*, and two opposite parts, as *co-A*, *c*. The rules of Napier connect these by the following mnemonic: The sine of the middle part equals the product of the tangents of the adjacent parts, and the sine of the middle part equals the product of the cosines of the opposite parts.





CIRCULATING DECIMALS. Decimals in which one or more figures are continually repeated in the same order; e.g. 0.333 . . . . . 0.25666 . . . . , 0.3172172 . . . . . are circulating decimals. These are sometimes called repeating decimals, and the figure or set of figures repeated is called the *repetend*. If the repetend begins at the decimal point, the decimal is called a pure circulate; otherwise the decimal is called a mixed circulate; e.g. 0.2727 . . . . is a pure circulate, but 0.25999 . . . . is mixed. If the repetend contains but one figure, it is called simple—otherwise, compound. If the first figures of repetends are of the same order, the repetends are said to be similar; and if they end with figures of the same order, they are said to be conterminous; e.g. 0.639292 . . . . and 0.253232 . . . . are both similar and conterminous. Periods over the first and last figures of the repetend serve to indicate that a decimal is a circulate: thus, $0.2\dot{7}\dot{3} = 0.27373$ . . . . Operations with circulating decimals may be performed in the usual way, or the circulates may be reduced to common fractions. This is usually done by applying the formula for the sum of an infinite geometric progression. (See Series.) Thus, $0.\dot{3}\dot{5}$ is the same as $0.35 + 0.0035 + 0.000035 + \ldots.$, in which the first term is 0.35 and the rate 0.01; hence, the sum is

$$\frac{0.35}{1-0.01} = \frac{0.35}{0.99} = \frac{35}{99}$$

That this fraction is the same as the decimal 0.35 may be seen by division.

CIRCULATING LIBRARY. See LIBRARY.

CIRCULATING MEDIUM. See MONEY.

CIRCULATION (Lat. *circulatio,* circular course, from *circulus,* circle, dim. of *circus,* circle). A term used in anatomy and physiology to designate the course of the blood through the blood-vessels. A knowledge of the heart, arteries, capillaries, and veins (qq.v.) is, of course, essential to a complete understanding of the subject of circulation; but by means of a diagram (Fig. 1), we can indicate the circulation of the blood in a general way. The shaded part of Fig. I represents the vessels carrying the impure or venous blood, which has already given up its oxygen to the body and taken in exchange the carbonic-acid gas. The unshaded diagram represents the vessels filled with pure blood, which is freely supplied with oxygen (arterial blood). The heart is shown here as composed of four chambers, of which the two right ones belong to the circulation of venous blood and the two left to that of arterial blood. Now the blood from the whole body is brought to the right auricle of the heart (*c*) by two large veins, the superior vena cava and the inferior vena cava, both of which are here represented by *d*. By the contraction of this chamber, the blood is forced through the right auriculo-ventricular opening into the second chamber of the right side of the heart, the right ventricle (*v*), and this by its contraction drives the blood to the lungs in the direction of the arrow pointing to *f*. The blood is prevented from returning into the auricle by the tricuspid valve, which completely closes the auriculo-ventricular opening during the contraction of the ventricle. In its passage through the lungs the blood is purified and oxygenated, and then is brought back to the heart again by the four pulmonary veins, entering the auricle on the left side. When this contracts, the blood is forced onward into the left ventricle, and then by ventricular contraction into the aorta for general arterial distribution. The mitral valve prevents regurgitation into the left auricle, and the semi-lunar valve at the beginning of the aorta stops any reflux into the ventricle. (Similar valves are present in the pulmonary artery.) The aorta divides into branches, and these in turn into smaller ones, until the whole body is supplied by a minute arterial plexus, or network; the smallest arteries divide into a finer network of still more minute vessels, the capillaries, which have extremely delicate walls, so that the blood can come into the closest relation with the cells of the body-tissues. It is in these capillaries that the oxygen is given off, the nourishment furnished to the body elements, and the waste products taken up into the blood. The capillaries then unite to form a venous plexus, and later small veins which unite with each other to form larger ones until we have all the blood collected into the superior and inferior venæ cavæ, and thus brought to the heart again.

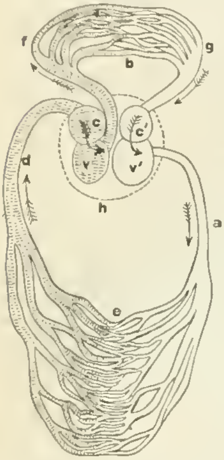


FIG. 1. Circulation of the blood: *h*, heart; *v*, right ventricle; *v'*, left ventricle; *c*, right auricle; *c'*, left auricle; *a*, aorta; *d*, vena cava; *e*, greater circulation; *b*, smaller circulation; *f*, pulmonary artery; *g*, pulmonary veins.

We see, from this description, that there are in reality two circulations—one, a short circuit, from the right side of the heart through the lungs to the left side of the heart; and the second, a longer circuit, from the left side of the heart through the body back to the right side of the heart. In the heart the two circulations connect with each other, and become continuous. In addition to the *pulmonary* and *systemic* circulations, described above, we have another subsidiary to the venous system, and known as the *portal circulation.* This is not indicated in the diagram. A certain amount of the blood of the intestines is collected into the portal vein and carried to the liver, where it traverses a capillary network in intimate relation with the liver-cells. Bile is formed and other important changes are effected in the blood, which is highly charged with foodstuffs recently absorbed in its passage through the intestinal capillaries. The blood is collected a second time into veins, and carried to the inferior vena cava, where it again joins the general circulation. In its passage through other special organs, the blood undergoes further modifications. See KIDNEY; SPLEEN; etc.

The anatomy of the organs concerned is given elsewhere, and we can consider them here only in their mechanical relation to the circulation. The heart is situated in the anterior part of the chest, lying between the right and left lungs, and inclosed in a membranous sac (the peri-

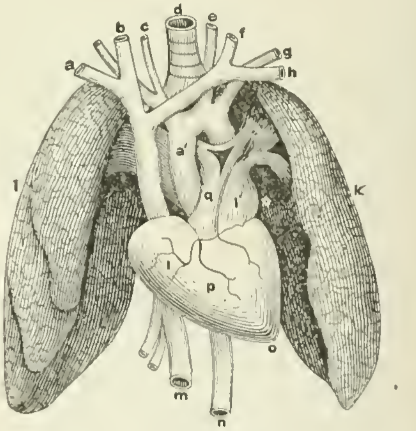


FIG. 2. The lungs, heart, and principal blood-vessels in man; *a*, *h*, veins from right and left arms; *b*, *f*, right and left jugular veins, returning the blood from head and neck. These four veins unite to form a single trunk, the *vena cava superior,* which enters the right auricle *l*; *c*, *e*, the right and left carotid arteries, the latter rising directly from the arch of the aorta, *a'*; the former from a short trunk called the *arteria innominata*; *g*, the left subclavian artery, rising directly from the aorta, while the right subclavian artery rises from the *arteria innominata*; *d*, the trachea or windpipe; *i*, *k*, right and left lungs; *l*, *l*, the right and left auricles; *p*, the right ventricle; *o*, the apex of the ventricle; *m*, the inferior or ascending *vena cava*; *n*, the descending aorta, emerging from behind the heart; *q*, the pulmonary artery.

cardium), which consists of an outer fibrous layer and an inner serous lining. The fibrous layer is continuous with the outer coat of the large vessels, which enter and leave the heart; but the serous layer is reflected from these vessels on to the heart itself, which it entirely envelops. We thus have two sacs, the one within the other, but continuous with each other at their necks, and between the two sacs a closed cavity, secreting just enough fluid to lubricate its walls. Within this cavity the heart, closely enveloped by the inner sac, moves free and unhindered at every contraction and with the minimum of friction. The shape of the heart is pyramidal; it is suspended nearly in the midline by the large vessels at its base, which firmly fix this portion; but otherwise the organ lies wholly free in the pericardium in a direction obliquely downward and to the left. The walls of the heart are almost entirely muscular, and the fibres are so arranged that by their contraction they diminish each cavity in all dimensions, and drive the blood forward with the greatest efficiency. The work accomplished by each contraction of the two ventricles together is estimated at about 4.5 foot-pounds. This represents the energy required to lift 4.5 pounds a height of one foot. On this basis, Houghton computes the total work of the heart in twenty-four hours at approximately 124 foot-tons.

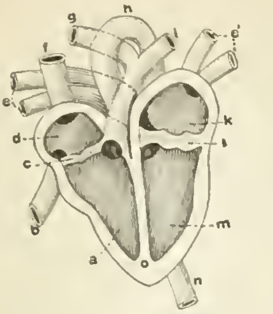


FIG. 3. Section of the human heart: *f, b*, the two *venæ cavæ*, opening into *d*, the right auricle; *a*, the right ventricle, from which proceeds the pulmonary artery, dividing into branches *g* and *i*, going to the right and left lungs respectively; *e, e'*, the pulmonary veins (two from each lung), entering into the left auricle, *k*; *l*, the mitral valve; *m*, the left ventricle, from which proceeds the aorta, whose arch is indicated by *h*, and the descending portion by *n*, none of its branches being shown in this figure; *o*, the partition or septum between right and left hearts.

In our outline of the circulation we have seen how the direction of the blood-current in the heart is rendered constant by means of the cardiac valves. The heart's action consists in successive alternate contraction (systole) and relaxation (diastole) of the muscular walls of the auricles and ventricles. During the period of relaxation, the blood flows into the two auricles from the veins, and they are gradually distended, while a certain amount of blood passes on into the ventricles through the auriculo-ventricular openings, which are patent during the entire diastole. At the end of this period the auricles are completely dilated, and their muscular walls contract and force nearly the entire contents into the ventricles. This action is very sudden, and occurs in both auricles at the same moment. The contraction begins near the entrance of the large veins, and extends onward toward the auriculo-ventricular openings; in this way the reflux of blood into the veins is guarded against, and any tendency is still further counteracted by the mass of blood in the veins and by the valves which are present in the veins near their opening into the heart. The force of the blood flowing into the ventricles is insufficient to open the semilunar valves, but distends the ventricles themselves, which are still in a condition of relaxation. The tricuspid and mitral valves float upward on the blood-current, and are in a position to close readily at the commencement of ventricular contraction. The ventricular systole follows immediately on the auricular systole. The contraction is slower but far more forcible, and entirely empties the ventricular chambers at each systole. The apex of the heart is thrown forward and upward with a slight rotatory motion, and this impulse (the apex beat) is detected between the fifth and sixth ribs, slightly to the right of the left nipple. For a short time following the ventricular systole, the whole heart is at rest. The entire cycle, therefore, can be divided into three periods, in the first of which the auricles contract, in the second the ventricles contract, and in the third both auricles and ventricles remain relaxed and at rest.

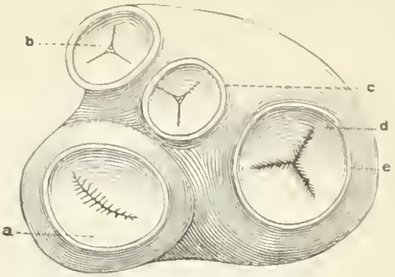


FIG. 4. Upper surface of the heart, the auricles having been removed.

When we listen to the heart we hear two sounds with every beat, and these are followed by a short pause. We can roughly express their relative quality by speaking the words 'lūbb-dŭp.' The first sound is dull and protracted, occurring at the same time as the apex-beat, and coinciding, therefore, with the ventricular systole. This sound is supposed to be due to the vibration of the auriculo-ventricular valves and their fibrous attachments, and also, to a less extent, to the stretching of the ventricular walls and the coats of the large arteries by the tension at the moment of contraction. The contraction of the mass of ventricular muscular tissue is possibly a minor factor. The second sound is shorter and much sharper in character; it is probably dependent on the sudden closure of the semilunar valves. Diseases of the heart-valves modify these sounds, and enable one to detect the abnormal condition. In the healthy adult, the heart-beats number about seventy-two per minute; but many circumstances, e.g. exercise, cause wide variations, even in health. The heart is under control of the nervous system, which influences it in a highly complicated manner.

The arteries contain a considerable amount of elastic tissue which, by yielding, breaks the shock of ventricular systole, and thus protects the vessels from sudden pressure. This tissue also equalizes the blood-current by its elastic recoil during cardiac diastole, and forces the blood forward in a steady stream. It does not originate force, however, but simply restores the force expended on it by the contraction of the ventricles. Because of their elastic character, the arteries readily dilate and contract according to the total amount of blood in the body; the muscular tissue of the arteries is an additional factor here. The arteries also tend to regain their normal calibre under all circumstances, because of this same elasticity, and easily adapt themselves to the different movements of the body.

The most important function of the muscular tissue in the arteries is to adjust the size of the vessels to the amount of blood which each part of the body requires, and also to adapt the calibre to the quantity of blood that the arteries contain at any moment. The force of the muscular contraction in the arteries is probably a very slight factor in propelling the blood. The impulse of the blood, when it enters the arteries at the moment of ventricular contraction, can be felt in all the superficial arteries of any considerable size; and we designate this as the pulse. For clinical purposes, it is usually felt in the radial artery at the outer side of the wrist.

In the mesentery of the frog, we can trace the circulation in the capillaries by means of the microscope; and our observations here can probably, without error, be applied to the condition in man. The red blood-corpuscles are seen moving along with considerable rapidity in the middle of the blood-current, while the white corpuscles advance more sluggishly along the walls of the capillaries. The capillaries present a far larger surface with which the blood comes in contact than the other blood-vessels, and therefore offer the greatest resistance to the progress of the blood. This resistance largely depends on the vital capillary force, so that the capillaries of themselves greatly influence the circulation. On the other hand, the condition of the arteries and veins exerts a decided control over the circulation in the capillaries which connect them. The propelling force in the veins is due to the impulse from the ventricles, and, to some extent, to the pressure exerted upon the veins by the muscular movements of the body. The suction action of the heart is also a factor to be considered. The presence of valves along the veins enables them to take advantage of all the force applied. It is estimated that a portion of the blood can traverse the entire circuit of the circulation in half a minute. The circulation begins at a very early period in fœtal life, and presents important modifications, which will be described under FŒTUS (q.v.). See also EMBRYOLOGY, HUMAN.

Our present knowledge of the circulation is of comparatively recent date. It was first described by Harvey, in his celebrated work, *Exercitatio de Motu Cordis et Sanguinis*, published in 1628.

CIRCULATION OF SAP. See SAP.

CIR'CULATO'RY SYSTEM, EVOLUTION OF. The organs by which fluids and sometimes gases and solids, suspended in the fluids, are transported from one part of the body to another. A circulatory system first becomes necessary when the organism gets to be of great size and a specialization of structure has taken place, so that the nutrient regions where fluid and gaseous food are supplied are far removed from the muscles, glands, and other organs which require that food, and where the excretory organs are distant from the great centres of metabolism. The circulatory system fulfills the function of transportation between the muscles and glands on the one hand, and the alimentary tract, respiratory organs, and kidneys on the other.

Lowest Forms.—In the Protozoa the body is so small that no special circulatory apparatus is necessary. The cell-structure with its water-spaces provides for carrying food in solution to the remotest plasm films. In the sponges the body often attains great size, but by the system of water-canals penetrating all parts of the mass, food and oxygen are directly brought, as it were, to the door of every cell. Even in the Cnidaria the body-wall is typically only two cells thick, so that between the external fluids and those of the cavity every cell is brought into direct contact with oxygenated water. In the Scolecida, where a true body-cavity between the alimentary tract and the body-wall makes its appearance, the fluids of this cavity serve to carry nutritive fluids and excreted products. The fluids of the body-cavity are often set in motion by the cilia of the lining cells. In the Mollusca the body is so large and the muscular system so well developed that a more effective transporting system is necessary. This is gained by the separation of special tracts of the body-cavity. In the dorsal part of the animal is a space that has gained thick muscular walls and constitutes a propelling organ or heart. The alimentary tract usually perforates the heart so that nutritive fluids by passing through the wall of the gut may reach the circulating fluid. From the heart a tubular space carries the circulating fluid to the spaces of the mantle and of the muscles and glands. These spaces are parts of the body-cavity and, as in the case of the foot, some of them even connect with the outside world. The fluids in these spaces and in the gills make their way, probably by the aid of cilia, to the heart. Oxygen is obtained both in the thin-walled mantle and in the gills. The Mollusca show thus a great advance in the specialization of a definite system of blood-vessels. The echinoderms have acquired much the same or a less perfect system of blood-spaces.

Arthropods.—Among segmented animals we find that many of the Polychæta have a well-defined system of blood-vessels, which they have perhaps derived from the nemerteans. The system shows an advance over that of nemerteans, however; for in the latter group there is no regular circulation, whereas in the Polychæta such a circulation is established. They have a main dorsal vessel and a median ventral vessel, and a circular transverse vessel running in the body-wall between the two. Vessels going to the alimentary tract get nutritive fluids and those going to the body-wall, parapodia, and gills bring back oxygen. The blood-vessels contain corpuscles and often hæmoglobin. The dorsal-vessel 'heart' contracts peristaltically. Not all Polychæta have a complete (closed) blood system, and in some cases the body fluid is the only circulating medium. The earthworms also have a well-developed system of vessels.

In the Crustacea there is usually a dorsal-vessel 'heart,' but well-defined arteries and veins are often lacking, the heart pumping the general fluids of the body-cavity. However, in the higher Crustacea, as, e.g. the lobster, definite vessels to the brain, muscles, gills, and alimentary tract appear, from which organs the blood is returned to the heart by blood-spaces. In insects the respiratory functions of the circulatory system are largely replaced by respiratory tubes which ramify even to the muscles. There is always a heart, however, and in Arachnoidea a number of well-defined blood-vessels.

In Vertebrates the organs of circulation are the heart, arteries, veins, and lymphatics. The heart is the central organ of the circulatory system. To it the blood is drawn by suction and is again forced out from it. The heart, as well as the rest of the vascular system, is of mesoblastic origin and appears close behind the gill-clefts. Like the other large blood-vessels, it is composed of layers, the outer (serous), the middle (muscular), and the inner (epithelium). Hence in origin the heart is a strongly developed blood-vessel. Its complicated structure, such as occurs in the higher vertebrates, is the result of folding and swellings. The heart in the lowest of the vertebrates and in embryonic life is at first divided into two chambers with valves between them to prevent the blood from flowing backward again. One chamber, the auricle, receives the blood. The other, the ventricle, expels it to the body again. By further modification the sinus venosus develops at the venous end and the bulbus arteriosus at the arterial end. Such a condition of heart occurs at some time in the embryonic development of all vertebrates, and it is the permanent condition in many fishes. With the development of lungs, and consequently of the pulmonary artery and veins, the primitive heart is much changed. This change from gilled to lung-bearing condition may be studied in the embryonic development of all lung-bearing vertebrates. The heart of fishes is simple, and, in structure, like the primitive heart described. It receives venous blood only, which it forces to the gills. In Dipnoi, where both gills and lungs exist side by side, the heart is half way between that of fishes and amphibia. In amphibia the ventricle is single, and hence the blood in it is mixed. In many of the amphibia the ventricle is continued into a conus arteriosus, which is spirally twisted and contains a transverse row of valves. Among reptiles an incomplete ventricular septum exists in lizards, snakes, and turtles, but there is a complete one in crocodiles. The blood from the right ventricle passes into the pulmonary artery and into the left aortic arch. There are fewer valves in the heart and only one row at the beginning of the aorta and pulmonary artery. In birds and mammals there are two auricles and ventricles—that is to say, auricular and ventricular septa are complete. The ventricles are the larger, and have more strongly developed walls. The blood from the head, heart, and body passes into the right auricle. In birds and mammals there is only one aortic arch. In birds it is the fourth right arch which persists, and in mammals the fourth left. In the embryological development of birds and mammals the auricles are, for a time, in communication through the foramen ovale. Much variation exists among mammals in the mode of origin of the carotids and subclavians from the arch of the aorta. In branchial vertebrates the dorsal aorta is formed by the union above the gills of the branchial vessels. The allantois vein, which plays so important a part in reptiles and amphibia, is functional in birds and mammals only for a time in embryonic life, and from birds onward the hepatic-portal system supplants the renal-portal.

The veins of vertebrates are provided with valves to prevent a back flowing of the blood.

The lymphatic system of elasmobranchs, amphibia, and, to some extent, of birds and reptiles, is provided with lymph-hearts. In fishes and amphibia there are large lymph-spaces, but from birds onward lymph-vessels with well-defined trunks are present. The main lymph-vessel is the thoracic duct which empties in mammals into the left and in the Sauropsida into both the right and left branchio-cephalic veins. The lymph-vessels like the veins, are provided with valves which prevent a reflux of the lymph-fluid. The lymph, like the blood, is composed of fluid and corpuscles. Lymphatic tissue occurs in fishes and amphibia, but lymph-glands proper appear along the course of the lymph-vessels, probably first in birds. In lymphatic tissue or glands the leucocytes, or white corpuscles of the blood, and lymph develop.

Bibliography. Sabatier, *Etudes sur le cœur dans la série des vertébrés* (Paris, 1873); Menagaux, *Recherches sur la circulation des Lamellibranches marines* (Besançon, 1890); Bojanus, "Ueber die Athem- und Kreislaufwerkzeuge der zweischaligen Muscheln," in *Isis* (1817, 1820-1827); Delage, "Contribution à l'étude de l'appareil circulatoire des crustacés édréophthalmes marines" in *Archive de zoologie expérimentale*, Vol. IX. (Paris, 1881); Cuénot, "Etude sur le sang et les glandes lymphatiques dans la série animale," in *Archive de zoologie expérimentale* (Paris, 1888-91); Müller, "Ueber das Gefässsystem der Fische," in *Abhandlungen der Berliner Akademie* (Berlin, 1839). See Anatomy, Comparative; and consult the authorities referred to there.

CIR′CUMCEL′LIO′NES (Lat. nom. pl., from *circum*, around + *cella*, cell; also called in Med. Lat. *circelliones*, by popular etymology with Lat. *circellus*, circlet, dim. of *circulus*, circle). Fanatical Donatists of the fourth century, who got their name from their habits of wandering. They rambled over the country, plundering, burning houses, and murdering those who made resistance, saying that by such means they sought the crown of martyrdom. They styled themselves *agonistæ*, wrestlers, or soldiers of Christ, and called their chiefs the leaders of the sons of the Holy One. Constantine treated them with forbearance; but his successors, Constans and Constantius, put them down with a strong hand. The name was also applied in the thirteenth century to a sect of fanatical heretics in Swabia, partisans of the Emperor Frederick II.

CIRCUMCISION (Lat. *circumcisio*, from *circumcidere*, to cut around, from *circum*, around + *cædere*, to cut). The cutting away of the foreskin, a religious ceremony practiced by many peoples in different parts of the world, and going back to the earliest known periods of human history. It is probably a substitute for an original phallic sacrifice. Among many races the custom of cutting off the phallus of their enemies has prevailed. It is significant that the ancient Egyptians performed this mutilation only in the case of enemies who were circumcised. In order to be cut off, the phallus must be clean —i.e. fit to be offered. The purpose of such an offering, presumably to some god of fertility, would naturally be to increase the fruitfulness of those making the sacrifice. Just as the sacrifice of the first-born was intended to insure the life of those born later, so the offering of the phallus of some youth was no doubt intended to increase the fertility of the tribe. The first modification of this rite seems to have been the substitution of gelding for the removal of the phallus, the object of emasculation being attained without the loss of life. The next step, at least in some cases, appears to have been such a painful mutilation as that which Niebuhr learned to know between Hejaz and Abu-Arish, on the Arabian coast. (Consult *Beschreibung von Arabien,* Copenhagen, 1772.) While very dangerous, this operation offered a chance of both life and virility. Finally, the removal of the prepuce was all that was required. In this form the mutilation was perpetuated either as a sign of the devotee, as a badge of priestly rank, or as a tribal mark. In the latter case it was generally administered as a sign of puberty and of capacity for participating in the cult, admitting the young man to the rights of cohabitation, and of presenting sacrifices to the ancestors and the tribal gods. The rite retained somewhat of its sacrificial character even after it had been transferred to infancy, as was the case with some peoples. That its object was to persuade the Deity to grant increased fertility was still felt in Egypt and Judea at the time of Herodotus and the priestly redactor of the Pentateuch. Its value as a sanitary and prophylactic measure was probably not brought to light until it was necessary to apologize for it as a superstition.

Circumcision seems to have been practiced already among the aborigines of the Nile Valley, who probably were akin to the Libyans. A man belonging to this race, gored by a bull, on one of the oldest monuments, is manifestly circumcised. (Consult *Bulletin des correspondances helléniques,* Paris, 1892, and Steindorff, in *Ægyptiaca,* Leipzig, 1897.) The dynastic Egyptians probably derived the custom from them. In the Græco-Roman period the rite may have been confined to the priesthood in Egypt, as Reitzenstein has tried to prove (*Zwei religionsgeschichtliche Fragen,* Strassburg, 1901). But if Herodotus was well informed, all Egyptians were circumcised. Boys may have been admitted to priestly orders at the age of puberty; but whether every circumcised boy whose mummy or likeness has been found belonged to a priestly family can neither be affirmed nor denied. The Babylonians and Assyrians do not seem to have practiced the rite. It cannot be proved that the Moabites, Ammonites, and Edomites did so before their invasion of Syria. The Philistines were not circumcised. But they were apparently Cretans (see CAPHTOR), and, according to Egyptian accounts, the Mycenæan peoples were not circumcised. From the fact that this peculiarity of the Philistines is strongly emphasized by the Hebrews, it may be inferred that the Canaanites practiced circumcision. They may have derived the custom from some aborigines akin to the proto-Egyptians and the Libyans, or from Egypt in a later time. It is quite uncertain whether the clans that afterwards formed the people of Israel knew the custom before they entered Palestine. The story in Exodus iv. retains the memory that the Moses clan considered itself saved from threatening destruction by the adoption of this rite from their Midianite or Kenite neighbors. The sign of Cain (the Kenite) in Gen. iv. is probably circumcision. This chapter seems to reflect an earlier attempt on the part of the Kenites to settle in Palestine. The people of the northwest Arabian country of Muzri, to which the Moses clan belonged, do not seem originally to have had the custom. This apparently is also suggested in the story in Joshua v. Here all Israel is circumcised at Gilgal, upon 'the hill of the foreskins,' to remove 'the reproach of the Mizrim,' which may mean the reproach cast upon the people of Muzri by their neighbors for not being circumcised. That the youth of Benjamin were brought to the sanctuary called 'the hill of the foreskins' to be circumcised there can be little doubt. But the shrine and the custom are likely to have been taken over from the Canaanites. No conclusion can be drawn from Gen. xvii., except that in the Persian period the fact that Ishmaelites practiced circumcision in the thirteenth year was traced back to the mythical ancestors of both Ishmaelites and Israelites. The story of Dinah in Gen. xxxiv. suggests that the Hivites in Shechem were forced to accept circumcision by Israelitish tribes; but this may in reality show that the custom existed among the Hivites and had to be accounted for. It prevailed in some parts of Arabia before Mohammed; and, though not mentioned in the Koran, it has been retained by the nations accepting Islam. There is no serious objection to the assumption that everywhere in the Semitic world it goes back to Egyptian, and ultimately Libyan, influence. Whether the Colchians (Karki, Kashki) originally practiced circumcision—and this might be taken as an indication of its prevalence among kindred Asiatic peoples—or it was brought to them in later times by colonists from Syria or Egypt, cannot be determined. It still prevails among the Mandingos, Gallas, Falashas, and many Bantu tribes in Africa, where it cannot be traced back to Moslem influence. In Central America, and among the Aztecs of ancient Mexico, circumcision, or a somewhat similar mutilation, was practiced. It is still in use among the Teamas and Manaos on the Amazon. The Otaheitans, the Tongas, some Melanesians in Polynesia, and nearly all tribes in Australia, have this custom. In the present state of our knowledge, a transmission of the rite through historic contact can not be affirmed, and an independent development from the same social and religious considerations is most safely assumed.

Circumcision of females, consisting of mutilation of the clitoris, is practiced in Egypt, Abyssinia, Western Africa, Arabia, and other countries. It was already known to Strabo. As it is very generally found where male circumcision prevails, it is probably analogous in its history and development to the latter. The opposition to circumcision began with some of the Hebrew prophets (Jer. iv. 4; ix. 25-6). But it was the struggle reflected in the Pauline literature that eliminated this religious rite from the Christian usage, except in isolated instances, such as the Abyssinian Church. Consult: Ploss, *Das Kind in Brauch und Sitte der Völker* (Leipzig, 1884); Salomon, *Die Beschneidung* (Brunswick, 1844); Glassberg, *Die Beschneidung* (Berlin, 1896); Zaborowski, in *Bulletin de la Société d'Anthro-*

pologie de Paris (1893); Gunkel, in *Archiv für Papyrusforschung* (1902).

CIRCUMFERENCE. See Circle.

CIRCUMFLEX (Fr. *circonflexe*, Lat. *circumflexus*, p.p. *of circumflectere*, to bend round. from *circum*, around + *flectere*. to bend.) A mark used to denote an original rising and falling in the pronunciation of a long vowel. In Greek the signs used are ˜ ^: in Latin the sign is ^. The last sign is sometimes used instead of the macron to denote simple length. The presence of a circumflex accent in a French word generally indicates that there has been a contraction. an *s* in most cases having originally stood between the vowel and the succeeding consonant; e.g. fête (feste), abîme (abisme), âpre (aspre).

CIRCUMLOCUTION OFFICE. The apt name applied by Dickens in *Little Dorrit* to the unspeakable British officialism. Of the law's delay he has given a capital concrete example in *Bleak House*.

CIR'CUMNUTA'TION (from *circumnutate*, from Lat. *circum*, around + *nutare*, to nod). A special case of Nutation (q.v.).

CIR'CUMPO'LAR STAR (Lat. *circum*, around + *polus*, pole, axis). Any star which, in the apparent daily revolution of the sky, does not pass below the horizon of the observer: or, in familiar language, does not set. It will be remembered that the apparent daily motion of the stars is in reality the result of the actual rotation of the earth upon an axis which passes through the centre of the earth and a point in the sky, near the north or polar star, and that the lines in which the stars seem to move—called lines of diurnal motion—are the circumferences of circles perpendicular to this axis. If an observer is at the equator. the axis lies in the observer's horizon. the circles of diurnal motion are all perpendicular to the horizon, and all stars seem to rise and set. If the observer is at a distance from the equator—for example, in latitude 10° N.—the northern end of the celestial axis is raised 10 degrees above the horizon, and any star which is within 10 degrees of the north pole of the sky will not pass below the horizon in its apparent motion about the pole. The largest circle of the sky that may be drawn about the pole without passing below the horizon of the observer is called the circle of perpetual apparition. A similar circle drawn about the opposite pole. without coming above the horizon. is called the circle of perpetual occultation. and the stars within that circle are never visible to the observer. What to an observer at a given latitude in the Northern Hemisphere is a circle of perpetual apparition, will to an observer in the Southern Hemisphere at any point equally removed from the equator be a circle of perpetual occultation: and vice versa. what to the former is a circle of perpetual occultation will to the latter be a circle of perpetual apparition, the stars within it being southern circumpolar stars.

CIRCUMSCRIBED AND INSCRIBED FIGURES. In plane geometry, a curve is said to be circumscribed about a polygon when it passes through all the vertices of the polygon; and in that case the polygon is said to be inscribed in the curve. A polygon is said to be circumscribed about a curve when all of its sides are tangents to the curve, and in that case the curve is said to be inscribed in the polygon. Thus, a circle can be circumscribed about or inscribed in any triangle, and vice versa. This is also true of a square or of a regular pentagon, hexagon, octagon, decagon, dodecagon, 15-gon, and, in general, regular polygons containing $3 \cdot 2^n$, $4 \cdot 2^n$, $5 \cdot 2^n$, $6 \cdot 2^n$, $8 \cdot 2^n$, $10 \cdot 2^n$, $12 \cdot 2^n$, $15 \cdot 2^n$ sides, and some others. The limitation is due to the restrictions of Euclidean geometry in the construction of regular polygons (q.v.). Surfaces, too, may be circumscribed and inscribed; e.g. a pyramid whose lateral faces are tangent to the surface of a cone is a circumscribed pyramid, the cone being then inscribed in the pyramid. The mensuration of the circle, sphere, cone, and cylinder may be effected by means of circumscribed and inscribed figures, with the aid of the theory of limits (q.v.). Thus, the perimeters of the circumscribed and inscribed regular polygons of a circle may be computed, and the circumference be taken, as the limit of either as the number of sides is indefinitely increased. When the diameter is 1 unit, this circumference becomes 3.14159265 units, which number expresses an approximation of π. See Circle.

CIRCUMSTANTIAL EVIDENCE. Evidence of facts and circumstances which surround, and are connected with. the particular facts to be proved, and which, taken together, the court and jury may reasonably consider as tending to prove or negative the particular facts sought to be established in the case before them. Circumstantial evidence is most frequently called for in criminal cases; especially where the crime is secretly committed, as murder by poison sent by mail. in which case there is generally little positive and direct evidence that the accused committed the act with which he is charged. The circumstances precedent to and connected with a crime may so associate the accused with the crime that an inference of guilt would be the only one that could reasonably be drawn from such circumstances; in which case there may be a conviction, even though there is no one who can testify, from actual knowledge, that the accused committed the act. See Evidence.

CIRCUS (Lat. *circus*, ring, circus, alluding to the shape of the arena). The Circus of ancient Rome corresponds to the Greek Stadium (q.v.). It was a large, oblong space, with curved end (whence the name), surrounded by tiers of seats and adapted for chariot-races and horse-races, and used also for the exhibition of athletic exercises, mock contests, and conflicts of wild beasts. Many sports originally held in the Forum were afterwards given in the Circus. During the entire republican period it was here and in the Forum that the contests took place which after the time of Cæsar were given in the amphitheatres. The Circensian Games were alleged by tradition to have originated in the time of Romulus, when they were dedicated to Consus or Neptune, and called *Consualia*. After the first war undertaken by Tarquinius Priscus, in which he captured the Latin city of Apiolæ, his victory was celebrated by games. A space was marked out for a circus around the Altar of Consus in the *Vallis Murcia*, between the Aventine and the Palatine, and the senators and knights were allowed to erect scaffoldings round it for themselves. The games continued to be held annually, and the tiers of wooden seats were made permanent and periodically renewed. This was distinguished, subsequently to the erection of the Flaminian and other *circi*, as the Circus Maximus. It was altered and enlarged at various times. According to different computations, it was capable of holding 150,000, 260,000, or 485,000 persons. Its extent also has been variously estimated. In the time of Julius Cæsar it was three stadia, or 1875 feet, long and one stadium, or 625 feet, wide, while the depth of the buildings surrounding the open space was half a stadium, or about 312 feet. The lower tiers of seats were, for the first time, built of stone in the time of Julius Cæsar; even after that the upper tiers were of wood, until the time of Domitian, when it was all of stone and marble, though its stage of greatest magnificence was reached under Trajan, who erected there a triumphal arch. The exterior was formed of three stories of arches, like the Coliseum, but built of white marble. Next in date came the Circus Flaminius, built in B.C. 221 in the Campus Martius, and a favorite meeting-place. It measured about 1000 by 400 feet. There was a Circus of Caligula and Nero, near the Vatican; a Circus of Hadrian near his mausoleum; a Stadium of Domitian at the Piazza Navona; a Circus in the Gardens of Heliogabalus; and a Circus of Maxentius on the Via Appia, two miles from the city. All these served as stone-quarries down to the close of the Renaissance, so that few traces are left of any of them, except that of Maxentius, which is merely stripped of its surface decoration. Its construction is believed to have differed very little from that of the large Circus. Along the sides and at the curved end were ascending ranges of wooden or stone seats for the spectators, forming the *cavea*, divided into bands (three in the Circus Maximus) or *mæniana* by horizontal passages called *ambulacra* or *præcinctiones*. Each *mænianum* was cut into *cunei* by numbered flights of steps, as in the theatre or amphitheatre, and each line of seats was numbered; but there were no individual seats, each person being allowed so much space by lines marked. The vaults and piers supporting the receding lines of seats were like those of the Coliseum. Light columns were erected, supporting temporary or permanent coverings for the spectators. Boxes of especial beauty were erected for the emperors, magistrates, etc.—some of them above the *carceres*. At the end opposite the curve-end were the *carceres*, or stalls, which were covered, and furnished with gates, and in which the horses and chariots remained until, on a given signal, the gates were simultaneously flung open. In the centre is the *spina*, a long and broad wall round which the charioteers drove, terminating at both ends at the *metæ*, or goals—three cones which marked the turnings of the course. At each extremity of the *carceres* is a stone tower. From its gates and castellated appearance, the whole of this side received the name of *oppidum*, or 'town.' Over the *carceres* were seats for the president of the games, the consuls, or other distinguished persons. There were four entrances, of which the most important were the *porta pompæ* and the *porta triumphalis*. The games were inaugurated by a procession from the Capitol, in which those bearing the images of the gods went first, and were followed by the performers in the games, the consuls, and others. This procession entered through the *porta pompæ*, while the *porta triumphalis* was that by which the victors left the circus.

The *spina*, an object conspicuous from its situation, was in general highly decorated with such objects as statues, small temples, altars, etc. In the *spina* of the Circus Maximus, two large obelisks were erected by Augustus and Constantius. This circus was also distinguished by six towers, and by a canal or *euripus*, formed by Julius Cæsar, to protect the spectators more effectually during the conflicts of wild beasts.

The circus was especially adapted for races—an amusement of which the Romans were passionately fond. The length of the race was seven circuits round the *spina*, and from ten to twenty races were run in each day. The number of chariots was usually four. The charioteers adopted different colors, representing the four seasons. Bets and party spirit ran high, and the victor received a substantial pecuniary reward at the end of the race. The athletic exercises, such as boxing and wrestling, which sometimes terminated fatally, were probably exhibited in the large open space between the *carceres* and the *spina*. The *ludus Troiæ* was a mock conflict between young men on horseback. A regular battle was sometimes represented (*pugna equestris et pedestris*). By the formation of canals and the introduction of vessels, a *naumachia*, or sea-fight, was occasionally exhibited; but under the Empire this species of exhibition, as well as the *venatio*, was gradually transferred to the amphitheatre (q.v., and NAUMACHIA). In providing for the *venatio*, or hunting of wild beasts, vast sums of money were expended. Animals were procured from every available part of the Roman Empire, including Africa and Asia. The exhibition afforded not only an opportunity for the display of private munificence or ostentation, but attained the importance of a political engine, which none who aspired to popularity ventured to overlook. When Pompey opened his new theatre, he is said to have given public exhibitions in the circus for five days, during which time 500 lions and 20 elephants were destroyed.

There is an almost continuous tradition from the Roman days of various performances for the amusement of the populace, corresponding in many particulars to those of the Roman amphitheatre. (See ACROBAT; JUGGLER.) The modern circus, as a combination on a large scale of feats of skill and dexterity, may be traced to the performances given in London, from 1770 on, by Philip Astley, at first in the open air, and from 1780 in his amphitheatre. After his death, in 1814 the great equestrian Ducrow was the most prominent figure in the development of the circus; but during Astley's lifetime traveling circuses had become common in England, and permanent amphitheatres had been opened in several large towns. After Astley's, the most notable English circuses were Hengler's and Sanger's. American traditions are less full and clear, but the development seems to have begun about the same time. The earliest definite figure is Rickets, whose performance Gen. Washington is said to have witnessed in Philadelphia, in 1780. But it was not until about 1830 that exhibitions on anything like a large scale began to be given. Purdy, Welch & Co., at this date, and Van Amburgh a few years later, gave performances which for the time were of considerable excellence; in fact, greater merit was often shown in individual work than later, as less reliance could be placed upon the magnificence of the accessories. The humor of the clown, which formed so large a part of the early attractions, has diminished in effect with the growth of the size of the ring. The horse, whose trained performances were the mainstay of the circus fifty years ago, has taken a secondary place. Feats of strength and aerobatic exhibitions now form the principal attraction; and the more hazardous they are, the better they are liked. In fact, there is a noticeable tendency in the popular mind to return to the Roman appetite for blood and peril of life. The lavish provision of entertainment can no longer find place in one ring; two and even three have become usual, with different exhibitions going on simultaneously. The organization of the modern circus, with which the name of P. T. Barnum (q.v.) is inseparably associated, has become an extremely costly and complicated affair, requiring as great executive ability as the conduct of a small army in the field. The development of railroad systems of this latter period, however, has made it possible to cover long distances with the immense quantity of paraphernalia belonging to the modern circus. The attainment of the present gigantic proportions by these organizations, and the investment of millions in the undertaking, has led present-day managers into a tendency toward consolidation of interests, which has all but taken definite shape in a division of territory between three or four great shows, one remaining in Europe for a year or two, while another covers the American field. See Zoölogical Garden.

CIRCUS FLAMINIUS. A circus built in a part of the Campus Martius, called Prata Flaminia by the Censor Caius Flaminius Nepos, who was killed in B.C. 217 at Lake Trasimenus. Its central position made it the frequent scene of public meetings and fairs; and in it, according to Sallust, took place Tulla's massacre of 4000 prisoners in B.C. 82. The open space of the circus was used as a rope-walk in the Middle Ages, and the arcades as lime-burners' kilns. All the remains have disappeared.

CIRENCESTER, sīz′e-tẽr, sĭs′e-tẽr, *and* sĭs′ĭ-tẽr (AS. *Cirenceaster*, *Cyrenceastere*). A market-town in Gloucestershire, England, on the Churn, a branch of the Thames, and on the Thames and Severn Canal, 17 miles southeast of Gloucester (Map: England, E 5). It has a large trade in agricultural produce, and is an important wool-market. There are also two breweries. In the neighborhood are the well-known Royal Agricultural College, with a farm of over 450 acres, and Oakley Park, the seat of Earl Bathurst. Cirencester was the Roman *Corineum*, at the junction of the Fossway with branches of the Icknield and Ermin roads, and has traces of ancient walls two miles in circuit. Roman relics found here, such as coins, urns, etc., form an interesting collection in the local museum. Rupert stormed Cirencester in 1642, but in 1646 it was given up to the Parliament. Population, in 1901, 7500.

CIRILLO, chḗ-rēl′lō, Domenico (c.1734-99). An Italian naturalist, born in Grugno. He was early called to a chair of botany in Naples, afterwards accompanied Lady Walpole to France and England, and on his return to Naples was appointed professor of medicine. He enjoyed the friendship of Buffon, Diderot, D'Alembert, and Franklin; and when the French established the Parthenopean Republic in Naples, in 1799, he was chosen a representative and became president of the Legislative Commission. After the reëstablishment of the royal government he was sentenced to death, and, stubbornly refusing to ask for mercy, he was executed soon afterwards. His principal works are *Fundamenta Botanica* (1787), and *Entomologiæ Neapolitanæ Specimen* (1787).

CIRL-BUNTING, sẽrl′bŭn′tĭng (Neo-Lat. *cirlus*, from It. *zirlo*, whistling, *zirlare*, to whistle, Sp. *chirlar*, to twitter). A small and very handsome European bunting (*Emberiza cirlus*), rare and local in England, often kept as a cage-bird, though its song is slight.

CIRPAN, chēr′pȧn. A town of Eastern Rumelia, Bulgaria, on the tributary of the Maritza, 30 miles east of Philippopolis. It is situated in a fertile fruit-producing region, and is noted for its mineral springs. Population, in 1893, 11,069.

CIRQUE, sẽrk (Fr., circle). The name applied to basins occurring in mountainous regions at the head of narrow stream-valleys and gorges. They are characterized by precipitous walls, which curve around in a semicircle, forming a natural amphitheatre. Their origin may be traced to the erosive action of converging glaciers and streamlets. See Corry.

CIRRHO′SIS (Neo-Lat., from Gk. *κιῤῥός*, *kirrhos*, tawny). A pathological change of tissues, consisting of hardening due to increase of connective tissue. It may occur in lung, spleen, ovary, heart, stomach, and peritoneum, but is oftener found in kidney or liver. *Cirrhosis of the kidney* (chronic diffuse inflammation of the kidney, or chronic interstitial nephritis) is a chronic inflammation of the connective-tissue elements of the kidney. The kidney is usually small, contracted, and nodular, the capsule adherent; the cortex is thin and red, and may contain small cysts. Microscopically, there is seen to be a marked increase in the interstitial connective tissue, with degeneration and atrophy of the functionating elements, the renal tubules, and the glomeruli. In the tubules the epithelium is apt to be granular, fatty, and atrophied. In the glomeruli the lesions vary from thickening of the capsules and of the capillary walls with hyaline degeneration, to complete atrophy and disappearance of the glomeruli. (See Bright's Disease.) *Cirrhosis of the liver*, or chronic interstitial hepatitis, consists in a greater or less increase in the connective tissue or supportive elements of the liver, at the expense of the functionating tissue. The new connective tissue usually follows the line of the old connective tissue, but may penetrate the lobules. It is often irregular in its distribution, being more abundant in one part of the liver than in another. During the early stages of the production of connective tissue, the liver tends to enlarge, sometimes weighing eight to ten pounds (hypertrophic cirrhosis). Later, the connective tissue tends to contract, and the liver becomes smaller than normal (atrophic cirrhosis). The surfaces of the large livers are usually smooth, while the irregular contraction of the connective tissue in the atrophic livers squeezes the lobules, and usually results in nodular surfaces. The new connective tissue, besides causing atrophy of the liver-cells, often compresses branches of the portal or hepatic veins and of the gall-ducts, thus interfering with the nutrition of the liver-cells, and causing stoppage of the bile-current. Dependent upon the condition in the liver and the consequent disturbance of the portal circulation, various secondary lesions occur, such as dilatation of the veins, accumulation of fluid in the abdomen, swelling of the feet and legs, etc. Increase in the connective-tissue elements of the kidney (cirrhosis of the kidney) and of the walls of the blood-vessels is frequently associated with cirrhosis of the liver, probably dependent upon the same obscure cause. See Liver; Alcoholism; Dropsy.

CIR′RHUS. A tendril (q.v.).

CIR′RIPE′DIA (Neo-Lat. nom. pl., from Lat. *cirrus*, a lock, curl + *pes*, foot). An order of small marine crustaceans (barnacles), characterized by their fixed life. The body is indistinctly segmented, attached by the head-end, and surrounded by a mantle. Limbs of the trunk, six pairs (rarely less or more), biramous, long and tendril-like. Circulatory system wanting. The species are mostly hermaphroditic. The cirripedia are closely allied to the Entomostraca. See Barnacle, and Plate of Barnacles. For a description of fossil forms, see Crustacea.

CIR′RUS. See Cloud.

CIRTA, sĭr′tȧ (Lat., from Gk. Κίρτα, *Kirta*, Phœn. *kereth*, Heb. *qiryat*, city). A city of northern Africa, the capital of the Numidian prince Syphax, and an important fortress of Masinissa and his successors. Later it became a flourishing Roman colony. It was much injured by the troops of Maxentius in A.D. 310, but was restored by Constantine and named Constantina. The modern Constantine occupies its site.

CISALPINE REPUBLIC (Lat. *cisalpinus*, from *cis*, on this side + *Alpes*, Alps). The name given to the State constituted in 1797 by the union of the Cispadane and Transpadane republics (respectively south and north of the Po, Lat. *Padus*), which had been established by Bonaparte in May, 1796, after the battle of Lodi. The Cisapline Republic embraced Lombardy, Mantua, Bergamo, Brescia, Cremona, Verona, and Rovigo, the Duchy of Modena, the Principality of Massa and Carrara, and the three legations of Bologna, Ferrara, and the Romagna. The Republic had a territory of more than 16,000 square miles, and a population of 3,500,000. Milan was the seat of the Government, or Directory. The Legislative Assembly was composed of a Senate of 80 members, and a Great Council of 160. The army consisted of 20,000 French troops, paid by the Republic. A more intimate connection was formed in 1798 between the new Republic and France, by an offensive and defensive alliance. The Republic was dissolved for a time in 1799 by the victories of the Russians and Austrians, but was restored by Bonaparte, after the victory of Marengo (1800), with some constitutional modifications and an increase of territory. In 1802 it took the name of the 'Italian Republic,' and chose Bonaparte for its President. A deputation from the Republic, in 1805, conferred on the Emperor Napoleon the title of King of Italy—after which it formed the Kingdom of Italy till 1814. See Italy; Napoleon I.

CISCO. The name of two separate species of whitefish: (1) the lake moon-eye (*Argyrosomus Hoyi*) of the Great Lakes—the smallest and most brightly colored of the whitefish; (2) the lake or Michigan herring (*Argyrosomus Artedi*), occupying lakes in shallow places from Wisconsin to Alaska. Both are excellent food-fish. See Whitefish.

CISLEITHANIA, sĭs′lī-thā′nĭ-ȧ *or* -tā′nē-ȧ (Neo-Lat., from *cis*, on this side + Ger. *Leitha*, a little river which forms part of the boundary between Austria and Hungary), or Cisleithan Austria. A name applied to that portion of the Austro-Hungarian monarchy represented in the Reichsrat in Vienna. It contains nearly 116,000 square miles, and had a population of 26,107,304 in 1900, or considerably more than half of the total population of Austria-Hungary.

CISPADANE (sĭs-pā′dān) **REPUBLIC.** A republican State of Italy, which comprised Modena, Reggio, Ferrara, and Bologna. It was merged in the Cisalpine Republic (q.v.) in 1797. It took its name from the Padus or Po, which divided it from the Transpadane Republic. It was established in 1796 by Napoleon I. after the battle of Lodi.

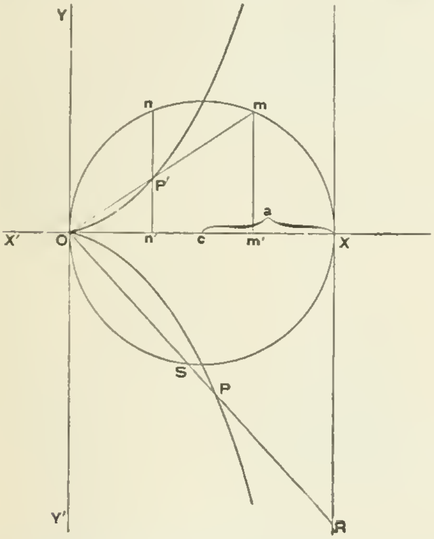
CISPLATINE (sĭs-plā′tĭn) **REPUBLIC** (Sp. *República Cisplatina*, from Lat. *cis*, on this side + Sp. *Plata*, the river dividing Uruguay from the Argentine Republic). The name of the Republic of Uruguay from 1828 to 1831. It had previously belonged to Brazil, and had borne the name of the Cisplatine Province.

CISSAM′PELOS (Gk. κισσάμπελος, *kissampelos*, from κισσός, *kissos*, ivy + ἄμπελος, *ampelos*, vine). A genus of plants of the natural order Menispermaceæ, of which some of the species possess valuable medicinal properties, particularly *Cissampelos Pareira*, a native of the West Indies and South America, the root of which was formerly thought to be that called Pareira brava. The plant is called velvetleaf in the West Indies, from the peculiar and beautiful appearance of the leaves. It is a climbing shrub, with round leaves, racemes of small, yellow flowers, and small, hairy, scarlet berries. The root of Cissampelos appears in commerce in pieces of 2 or 3 feet long, varying from ½ to ¾ inch in diameter, tough, but so porous that air can be blown from end to end of it. It is dark-brown externally and light-yellow within. It has a sweetish, afterwards nauseous, taste; is used as a tonic and diuretic, appears to exercise a specific influence over the mucous membrane of the urinary passages, and is administered with advantage in chronic inflammation of the bladder. Formerly this plant was supposed to yield all of the Pareira brava on the market; but now it is rare, its place being supplied by the roots of *Chondodendron tomentosum*, a plant of the same order found in Brazil, Peru, and elsewhere in South America. The root of this species, as found in the market, is of a grayish color, pale-brown within, and with a waxy appearance when freshly cut. The roots vary from ½ inch to 3 inches in diameter, are longitudinally furrowed, and in sections show concentric markings. Another kind is also found in the American market, which greatly resembles *Cissampelos Pareira*, but its exact botanical origin is not known.

The properties of all are the same. They contain a bitter extractive and an alkaloid, pelosine or cissampeline, said to be identical with beberine and buxine Pareira brava was introduced into European medicine in the latter part of the seventeenth century. In Brazil, in addition to its other uses, it is employed as a remedy for snake-bites, a vinous infusion being taken internally, while the bruised leaves are bound over the wound.

CISSEY, sē'sā', ERNEST LOUIS OCTAVE COURTOT (1811-82). A French general. He was born in Paris, and was educated at the school of Saint Cyr. Having served with distinction in Algeria and the Crimea, he was promoted in 1863 to be general of a division. He fought in the Franco-German War, and in the contest against the Commune of 1871. After being elected to the National Assembly (February, 1871), he was Minister of War from 1871 to 1873 and in 1874-76. He was elected life Senator in 1875.

CIS'SOID (Gk. *κισσοειδής*, *kissoeidēs*, like ivy, from *κισσός*, *kissos*, ivy + *εἶδος*, *eidos*, shape, form). An ivy-like curve, first studied by Diocles, about B.C. 180. The commentary of Diocles sets forth the definition of the cissoid, which in modern notation will be understood from the figure. The ordinates mm', nn' are equidistant from the centre c, and the line Om cuts nn' in P', a point on the cissoid. A more general construction is the following: Draw any line OR from O to XR, and take RP = OS. Then P will be a point on the curve. The Cartesian equation of this curve is $y^2 = \frac{x^3}{2a-x}$, and the polar equation is $r = 2a \tan\theta \sin\theta$. (See ANALYTIC GEOMETRY.) The curve passes through the points (a, a) and $(a, -a)$, is symmetric with respect to the X-axis, and lies between the Y-axis ($x = 0$) and the asymptote XR, whose equation is $x = 2a$; the origin is a cusp of the first species. (See CURVES.) Huygens expressed the length of an arc of this curve limited by any two points (rectified it) in 1651. The area of the space included between the two branches and their asymptote was first given by Fermat (1661); it is equal to three times the area of the generating circle. If, instead of the circle, any other curve is taken as the generatrix, the resulting curve is called cissoidal. The cissoid is the pedal (see CURVES) of a parabola with respect to the vertex. This curve has been used in solving two famous problems of antiquity—the construction of two geometric means between two segments, and the duplication of the cube (q.v.). Consult: Klein, *Vorträge über ausgewählte Fragen der Elementargeometrie* (Leipzig, 1895); translated by Beman and Smith, *Famous Problems of Elementary Geometry* (Boston, 1894); Gow, *History of Greek Mathematics* (Cambridge, 1884).



CIST, HENRY MARTYN (1839—). An American lawyer and soldier, born in Cincinnati, Ohio. In 1858 he graduated at Farmer's (afterwards known as Belmont) College. He became a member of the Sixth Ohio Volunteers upon the outbreak of the Civil War, and advanced to the rank of assistant adjutant in the Department of the Cumberland, in which capacity he was attached to the staff of Generals Rosecrans and Thomas. He was corresponding secretary of the Society of the Army of the Cumberland from 1869 to 1892. In addition to twenty annual reports of the society, and numerous articles in periodicals, he wrote *Life of General George H. Thomas* (in collaboration with Donn Piatt) and *The Army of the Cumberland* (1882).

CIST-BURIAL (Welsh *cist*, from Lat. *cista*, Gk. *κίστη*, *kistē*, chest). A mode of disposing of the dead among various peoples, chief among whom are certain American aborigines. A cell or box of stone slabs was placed in a shallow grave, and in this the remains were placed, usually folded into the smallest possible compass, sometimes denuded of flesh, together with the mortuary sacrifices; over these a broad slab was laid, and earth was spread above, sometimes in a mound. See ARCHÆOLOGY, AMERICAN; MAN, SCIENCE OF; MORTUARY CUSTOMS.

CISTER'CIANS. A branch of the Benedictine (q.v.) Order; also known as Bernardines, from their most famous member. It takes its name from the mother house of Cîteaux (Lat. *Cistercium*), near Dijon, which was founded in 1098 by Saint Robert, Abbot of Molesme. He transferred twenty of his most zealous monks from the latter house, on account of the unhealthfulness of its site, and established a small and poor monastery at Cîteaux. (The present building dates from the eighteenth century; it was confiscated at the Revolution, but recovered to pious uses in 1846, since when it has been used as a reformatory.) Robert's successor, Alberic, obtained from Pope Paschal II. a confirmation of the new foundation, and drew up statutes which insisted on a strict observance of the Benedictine rule. A brown habit was at first worn; soon, however, perhaps to mark a contrast with the Cluniac Congregation, this was changed to white, with a brown, and later a black scapular. Alberic died in 1109, and was succeeded by Stephen Harding, an Englishman. He pressed the rule of poverty to the utmost, applying it to the community as much as to the individual members. This extreme strictness diminished the number of postulants, so that the future looked unpromising, when in 1112 Saint Bernard (q.v.), with thirty companions, joined the struggling community. The numbers now began to increase, and Stephen was enabled within two years to found four other abbeys—La Ferté, Pontigny, Clairvaux, and Morimond. Fifty years later the Order numbered 343 abbeys, and by the middle of the fourteenth century more than 700—in France, Germany, England, Ireland, Spain, Portugal, Norway, and Sweden. The austere and holy life of the early Cistercians won them universal respect, and a vast influence throughout Christendom. They produced few great writers, but were indefatigable in collecting and copying manuscripts for their libraries. Practical matters, however, were not neglected in their zeal for literature and art: in England the Order was a main cause of the growth of the wool industry.

After this Golden Age followed a period of decline. The rule was less strictly observed; many disorders crept in toward the end of the fourteenth century, and by the middle of the fifteenth the Order had split into several congregations. The growth of luxury, the spread of the mendicant orders, and the practice of granting abbeys *in commendam* (see ABBOT) all contributed to its decay. Among the more noteworthy offshoots of the Cistercians were the Feuillants and the Trappists (q.v.), and the Nuns of Port Royal in France. Before the Reformation, England had 75 Cistercian monasteries and 25 nunneries. Among the English abbeys were Furness, Fountains, Woburn, Tintern, Kirkstall, and Rievaulx. Between internal decline and the hostility of various governments in modern times, the great majority of the Cistercian houses have ceased to exist. They are represented by a few in Belgium and Austria, one in England (at Mount Saint Bernard, near Leicester), and two in Ireland.

The influence of the Cistercians in art is sufficiently important to call for a separate treatment. When Saint Bernard directed the policy of the Order, he used it to carry out, among other things, his ideas as to the function of the fine arts. He wrote and preached against the current artistic extravagances in the construction, decoration, and furnishing of churches. As the Order spread throughout the world during the twelfth century it carried with it these ideas, some of which (for example, the invention of a single low, wooden bell-tower) were even expressed in the constitutions of the Order. Cistercian artists, therefore, were architects, and of the constructive rather than of the decorative school. This is the only Order that can boast of having consistently carried out an æsthetic ideal and had a style of its own, similar in whatever land it appears, and little affected by local art. Everywhere the Order exercised a strong influence. The Dominicans and Franciscans borrowed from it many of the peculiar traits of their churches. The Cistercians adopted at once the vaulted type, and were the pioneers of the Gothic revolution, carrying its germs, in Burgundian form, to nearly every civilized country. It was not until the middle of the thirteenth century that the Order had largely yielded its simplicity to the advance of the rich and harmonious style of cathedral Gothic, though before that it had begun to change in minor ways, as in allowing the use of stone in place of wooden towers. When the special mission of the Order was finished, its monasteries, being in remote country districts, were often allowed to go to ruin; but many of the most notable architectural monuments of its golden period remain worthy to stand by the side of the great cathedrals. Such are the abbeys of Maulbronn, Heiligen-kreuz, Lilienfeld, and Tischnowitz, in Germany and Austria; of Chiaravalle, Fossanova, and Casamari, in Italy; of Pontigny in France; Batalha in Portugal; Veruela in Spain, and those named above in England.

For the history of the Order, consult: Janauschek, *Origines Cistercienses* (Vienna, 1877); Guignard, *Monuments primitifs de la règle cistercienne* (Dijon, 1877); D'Arbois de Jubainville and Pigeotte, *Etude sur l'état intérieur des abbayes cisterciennes aux XII. et XIII. siècles* (Paris, 1858). For the architectural side of the subject: Sharpe, *The Architecture of the Cistercians* (London, 1874); Eulart, *Origines de l'architecture gothique en Italie* (Paris, 1893); and the works named in the article on MONASTIC ART.

CISTERN (OF. *cisterne*, Lat. *cisterna*, reservoir, from *cista*, chest). An artificial reservoir, usually of masonry or woodwork, and located either above the ground, or, more commonly, in an excavation. In places where the supply of water is intermittent, or where rain-water is used, every house requires a cistern, tank, or other receptacle for storing water. For comparatively large supplies of water, such as are required for manufacturing and railway service, receptacles for storing water are now almost universally termed reservoirs, tanks, or stand pipes. See WATER-WORKS; DAMS AND RESERVOIRS.

CITADEL (Fr. *citadelle*, It. *cittadella*, dim. of *città*, a city, especially a fortified city). The fortified stronghold of a city or town; hence also the strongest part of any extensive fortification. Its function in ancient systems of fortification was akin to that of the donjon or keep of a castle; it provided a refuge of last resort for a garrison driven from the other works, in which they might hold out for a while longer against the enemy while awaiting succor from the outside. The mediæval citadel was accordingly situated, as a rule, at the most commanding and externally inaccessible angle of the city walls, with one gate opening toward the town and a sally-port toward the country. Modern warfare, with its long-range artillery and external lines of defense by earthworks and masked batteries, has rendered these old-time devices obsolete.

The term citadel is applied not only as above, to special portions of a system of fortifications, but also to any commanding and strongly defended castle or fort dominating a town, at once for defense and refuge. The acropoles of ancient Greece (as at Athens, Corinth, Tiryns, etc.) constituted the citadels of those towns. (See ACROPOLIS.) Edinburgh Castle, the ruined citadel-castle of Smyrna, and the historic fortress of Antonia at Jerusalem (not extant) are examples of citadel-castles in this sense. The fortified prison of the Bastille, in Paris, deemed impregnable until the Revolution of 1789, was the citadel of that royal capital. The fortified heights of Quebec are still called the Citadel. See CASTLE.

CITATION (ML. *citatio*, from Lat. *citare*, to call). A mandate of a court of competent jurisdiction, commanding the person or persons named therein to appear in that court for some purpose specified briefly in the citation.

It was originally the process by which a suit was begun in the English ecclesiastical courts, which formerly had jurisdiction over orphans, decedents' estates, and divorce proceedings.

In the United States the term is most frequently used to designate the process of surrogates', orphans', probate, and admiralty courts, commanding persons interested in a proceeding in such court to appear and show cause or reasons, if they have any, why the relief demanded by the party bringing the proceeding should not be granted, or for the purpose of receiving instructions, to make an explanation, or to show cause why they should not be punished for disobedience of some order, rule, or decree of the court.

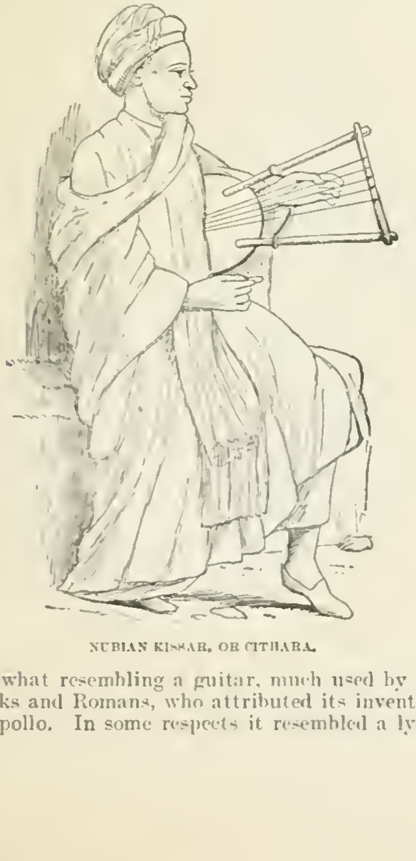
The failure to obey a personal citation—that is, one for instructions or discipline—may render a party guilty of contempt of court; but if it is merely formal, notifying a party to appear and protect any interest he may have in a certain proceeding, appearance is not insisted upon, and the party merely waives any right to object to the proceedings by failure to appear.

In Scotch practice, the act of an officer in summoning a party to an action under a proper warrant is called citation. The term is also employed in the civil law.

The word 'citation' is also used in law in the sense of the naming of an authority; as, the citation of a reported case in a legal text-book. See SUMMONS; SUBPŒNA; PROCEDURE.

CITHÆ'RON (Lat., from Gk. Κιθαιρών, *Kithairōn*). A mountain range in Greece, between Bœotia and Attica. The highest peak is a little over 4600 feet above sea-level. It is now called Elatea—i.e. 'Pine Mountain.'

CITH'ARA (Lat., from Gk. κιθάρα, *kithara*, a kind of lyre or lute). A musical instrument, somewhat resembling a guitar, much used by the Greeks and Romans, who attributed its invention to Apollo. In some respects it resembled a lyre; but it was played resting on the knees, whereas the lyre stood upright between them. The cithara had a hollow body, made sometimes of tortoiseshell, from which two horns branched upward, supporting a cross-piece. The strings were stretched from this cross-piece to the body of the instrument, where they were supported by a bridge. Sounds on the lower strings were produced by the fingers of the left hand; on the upper, by the plectrum. From the cithara were derived the mediæval cither, and our modern zither and guitar. The modern instrument most nearly allied to the cithara is the Nubian kissar. See LYRE.



NUBIAN KISSAR, OR CITHARA.

CITIES OF THE PLAIN. An appellation of the cities of Sodom and Gomorrah, which were situated in the plain about the Jordan, and were destroyed because of their wickedness.

CITIZEN (OF. *citeain*, from Lat. *civitas*, state, from *civis*, citizen). In its most general sense, an individual member of a political society, or State; one who owes allegiance to, and may lawfully demand protection from, the Government, and thus equivalent to subject. The original meaning of the term, as denoting a person endowed with certain rights and privileges as a native or naturalized resident in a city, a free and lawful member of a civic community, has in America become its secondary signification; its Roman meaning, as a member of a free, self-governing commonwealth, having superseded it. It is in this latter sense, also, that it is employed in the French and Swiss republics. In England, however, it is properly employed only in the narrower sense, as equivalent to *municeps*; and this is its meaning, generally, in the law of modern monarchical States, in which the relation of the citizen to the State is expressed by the term 'subject.' In Imperial, as well as in Republican Rome, the State continued legally to be regarded as a commonwealth of free citizens, bound together by the tie of common membership of one body. The modern relation of sovereign and subject, which has been substituted for that of commonwealth and citizen, is of feudal origin, the oath of allegiance, on which it is based, being in its essence the creation of the feudal obligation of fidelity and obedience due from a vassal to his lord.

It will be observed, then, that the more general sense of the term citizen—that in which it is employed in the United States and in other modern republics—is more closely in accordance with the original and historical meaning of the word. In the free republics of classical antiquity, the term 'citizen' signified, not a resident of a town, but a free, governing member of the State, just as the term *civitas*, from which we derive our 'city,' signified, not merely a local municipality (*urbs*), but the State at large. The confusion is doubtless due to the importance of the rôle which several of these city-states—as Athens and Rome—have played in history. In the ancient cities not all the inhabitants, perhaps not all the free inhabitants, were citizens, but these constituted a class entitled to special privileges and immunities; and as these cities formed the type of free government in the ancient world, the term 'citizen' soon came to mean one who possessed full civil and political rights. The Greek idea of citizenship is expressed by Aristotle, who declared a citizen to be one to whom belonged the right of participating both in the deliberative or legislative and the judicial functions of the political community of which he was a member. The right was jealously guarded, and was rarely conferred on those of foreign birth. In Rome there were two classes of citizens—one that had a share in the sovereign power, i.e. were capable of attaining to the highest offices of State; the other possessing only the private rights of citizenship. These, however, included the privilege of voting in the public assembly. There, as in the American Republic and in some other modern States, citizenship, though usually acquired by birth, might be attained by naturalization, or special grant of the State. In the later period of the Empire, Roman citizenship, so highly valued under the Republic and early Empire, largely lost its distinctive character, in consequence of the gradual disappearance of the political and legal privileges which formerly attended it. In the third century of our era, the constitution, or decree, of Caracalla extended it to all persons, except slaves, freedmen, and their children, under the sway of the Empire. and Justinian completed the work by extending it to all free persons.

In the United States, as has been said before, the word 'citizen' is used in its broadest sense, as defined at the beginning of this article. Perhaps as simple a statement as any is that made by an Attorney-General of the United States, when he said: "The phrase. 'a citizen of the United States,' without addition or qualification, means neither more nor less than a member of the nation." The same person may be. and usually is, a citizen of the United States and of the State in which he resides. The two things are not, however, necessarily coexistent; for an inhabitant of one of the Territories or of the District of Columbia is a citizen of the United States without being a citizen of a single State, and there are conceivable legal conditions which might make a man a citizen of a certain State without being a citizen of the United States. The idea of citizenship does not necessarily involve the right of voting or of other participation in political activity, as in the Greek conception of the term, for women and minors may be citizens, although excluded from all direct political activity. The question of race does not now enter into the definition of citizenship; previous to the adoption of the Fourteenth Amendment, this could not be stated, as the possession of negro blood was before that distinctly a disqualification from citizenship; yet even before the passage of the Fourteenth Amendment this position was doubted. The decisions denying the citizenship of Indians were founded not on race distinction, but on the existence of tribal relations, which were inconsistent with full allegiance to the United States.

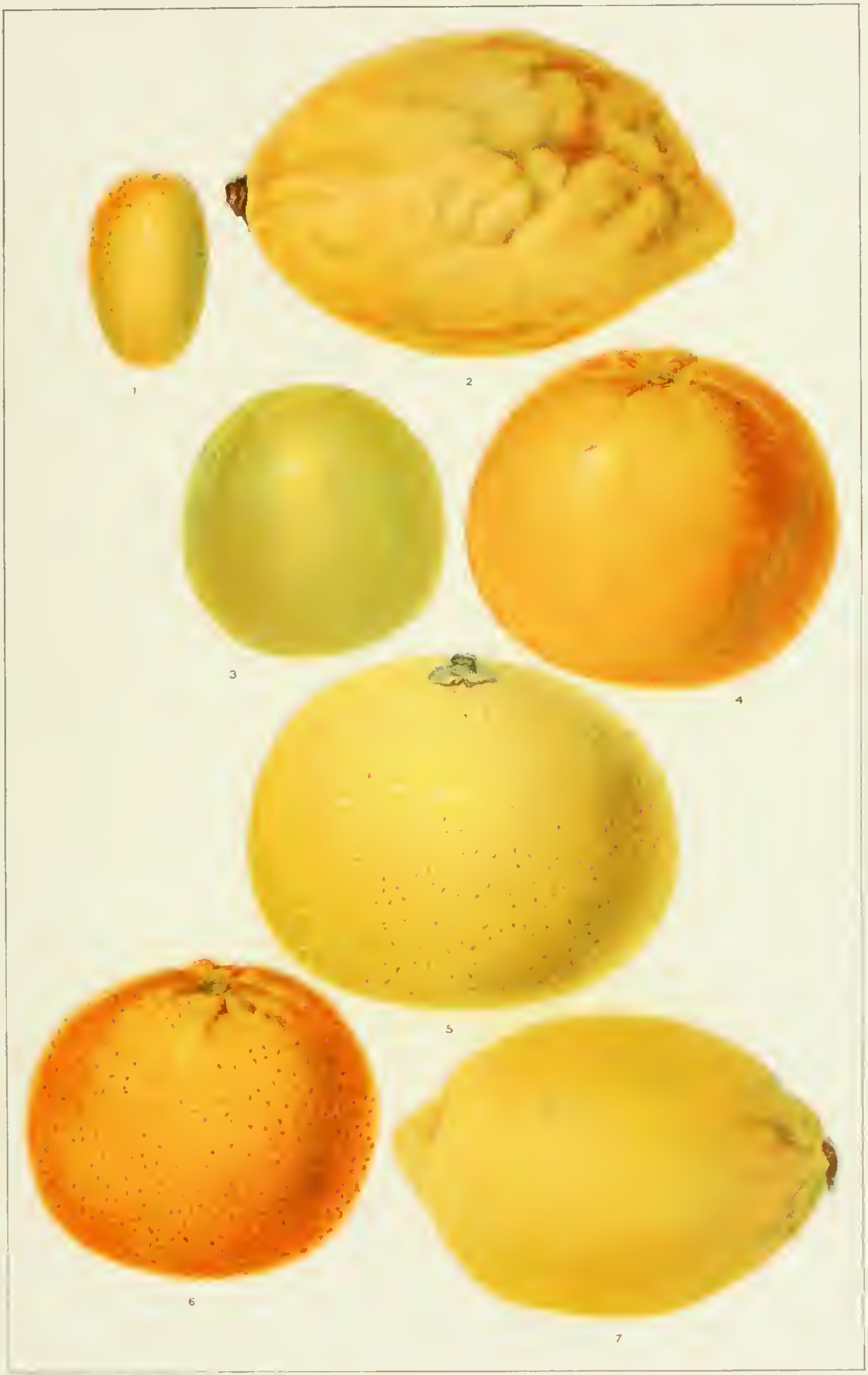
A citizen of the United States may be either native-born or naturalized. Among native-born citizens are included all persons born in the United States and not subject to any foreign power, including even the children of alien parents, unless the latter be ambassadors of a foreign power, but excluding untaxed Indians still in tribal relations; children born in foreign countries of fathers who were citizens of the United States at the time of birth; freedmen not recognized as citizens before the Act of Emancipation, but so recognized by that act and by the ensuing Fourteenth Amendment; Indians born in the country who have abandoned tribal relations, have entered into civilized life, and have by paying taxes recognized their allegiance; and Indians who have accepted allotments of land in severalty under the Dawes Act of 1887.

We have already said that minors and women are citizens in the meaning of the term found in the United States Constitution; it is also true that wives of citizens who were neither born in the country nor naturalized become citizens by their marriage, if they were not legally incapable of naturalization. A naturalized citizen is one who was originally a subject of a foreign State, but who has been received by the United States as a citizen under the acts of Congress bearing on that subject. Theoretically, treatises on international law have always doubted the power of the subject to throw off his natural allegiance, and of a State to accept the allegiance of the subject of a foreign country. But these rights have been exercised, in point of fact, very generally; and the right of naturalization is now recognized by treaties between the United States and many foreign powers. A person who is naturalized is admitted to all the privileges and duties of citizenship; and his naturalization includes that of any minor children resident at the time in the United States.

In regard to the dual citizenship to the general Government and to the State in which a person resides, it may be said that a citizen of the United States owes his first and highest allegiance to the general Government. The relations of the two forms of allegiance have been defined as follows by the United States Supreme Court: "There is in our political system a government of each of the several States, and a government of the United States. Each is distinct from the others, and has citizens of its own, who owe it allegiance, and whose rights, within its jurisdiction, it must protect. The same person may be at the same time a citizen of the United States and a citizen of a State; but his rights of citizenship under one of these governments will be different from those he has under the other. The Government of the United States, although it is, within the scope of its powers, supreme and beyond the States, can neither grant nor secure to its citizens rights or privileges which are not expressly or by implication placed under its jurisdiction. All that cannot be so granted or secured are left to the exclusive protection of the States. A citizen of the United States owes his first and highest allegiance to the general Government, and not to the State of which he may be a citizen. A declaration of war, or the commencement of actual hostilities, between two States, *ipso facto*, dissolves the partnership relation existing between citizens of the hostile States." The word 'citizen' is often loosely used as synonymous with resident or inhabitant. Where a law passed for a particular purpose makes such loose use of the word, and where no question of constitutional rights is involved, the courts will interpret the word according to the intention of the lawmakers. See ALIEN; ALLEGIANCE; NATURALIZATION; SUBJECT; and the authorities referred to under those titles.

CITIZEN, THE. A comedy by Arthur Murphy, performed July 2, 1761, at the Drury Lane Theatre, London, and printed (as a farce) in 1763. It is founded in part on Destouches's *Fausse Agnès*.

CITRUS FRUITS



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1 KUMQUAT NEARLY NATURAL SIZE CITRUS JAPONICA
2 CITRON ½ NATURAL SIZE CITRUS MEDICA
3 LIME NATURAL SIZE CITRUS MEDICA VAR ACIDA
4 ORANGE ⅔ NATURAL SIZE, CITRUS AURANTIUM VAR SINENSIS
5 POMELO ½ NATURAL SIZE CITRUS DECUMANA
6 MANDARIN ¾ NATURAL SIZE CITRUS AURANTIUM VAR NOBILIS
7 LEMON ⅝ DIAMETER CITRUS MEDICA VAR LIMON

CITIZEN KING, The (Fr. *le roi citoyen*). An appellation bestowed upon Louis Philippe, King of France from 1830 to 1848. He had favored the revolutionary movement in his younger days, and continued, even after he had mounted the throne, to sympathize with the people, though only in a half-hearted way.

CITIZEN OF GENE′VA (Fr. *citoyen de Genève*). An appellation of J. J. Rousseau, who was born in Geneva.

CITIZEN OF THE WORLD, The. The pen-name employed by Oliver Goldsmith, in his *Letters from a Chinese Philosopher, residing in London, to His Friends in the East*—a series of papers, contributed to the *Public Ledger*, beginning January 24, 1760, and published in book-form in London, 1762.

CITRIC ACID (Fr. *citrique*, Lat. *citricus*, from *citrus*, citron), $C_3H_4(OH)(COOH)_3 + H_2O$. A crystalline organic substance found in various plants, especially in the fruits of the lime (*Citrus bergamia*) and the lemon (*Citrus lemonum*). The citric acid of commerce is obtained from the lemon's juice, which is made in large quantities in southern Italy, in northern Africa, in the West Indies, etc. To obtain citric acid, lemon-juice is boiled (to coagulate all proteid matter), and neutralized with chalk and lime; the precipitate of calcium citrate thus obtained is decomposed by boiling with dilute sulphuric acid; on filtering, and evaporating the filtrate, citric acid crystallizes out in the form of colorless rhombic prisms, freely soluble in water, and having an agreeable acid taste. Citric acid has the property of preventing the precipitation by potash or ammonia of the hydroxides of iron and certain other metals. This property is utilized in calico-printing, citric acid being employed to prevent the formation of certain colors where they are not called for. Citric acid is also used in making refreshing effervescent drinks; the pure acid, or preferably lemon-juice, is very beneficial in scurvy; formerly it was popularly believed to be an excellent remedy for rheumatism; it is also used to increase the secretion of saliva and to allay thirst in fever. It is often used in medicine in combination with iron, magnesium, lithium, quinine, etc. Chemically, as its constitutional formula shows, it is a monoxy-tribasic acid, and is therefore capable of forming three series of salts, in which one, two, or all the three of the acid hydrogens are replaced by metals. It is somewhat similar to tartaric acid, from which it may, however, be readily distinguished by testing the solubility of its calcium salt, $(C_6H_5O_7)_2Ca_3+4H_2O$, which is insoluble in potash, and is more soluble in cold than in hot water. Citric acid melts at 100° C. in its water of crystallization, which it loses at 130°. If heated further to 175° C., citric acid loses the elements of water, and is transformed into aconitic acid—an unsaturated tribasic acid, having the formula $C_3H_3(COOH)_3$. Citric acid was discovered by Scheele, in 1784; its properties were investigated by Berzelius and Liebig.

CIT′RIL, or Citronenfink (probably corrupted from *citrine*, Neo-Lat. *citrinella*, from Med. Lat. *citrinus*, citron-colored, from Lat. *citrus*, citron; so called from the color of its breast). A small canary-like finch (*Chrysomitris citrinella*), of southern Europe, related to the American goldfinch, and a favorite cage-bird in Europe for the sake of its song.

CITRON (Lat. *citrus*, Gk. *κἱτρον*, *kitron*, citron; possibly of Semitic origin; cf. Heb. *qāṭar*, Ar. *qaṭara*, to be fragrant), *Citrus medica*, or *genuina*. (See Citrus.) A tree, allied to the orange and lemon, cultivated in the south of Europe, and to some extent in Florida and California. It is a native of the forests of the north of India. The citron has oblong toothed leaves; the flowers are externally of a violet color; the fruit is large, warted, and furrowed; the rind is very thick and tender; the pulp is sub-acid. The part chiefly valued is the rind, which is candied, preserved, and used in confectionery and for culinary purposes. The juice is sometimes employed to make a syrup; or, with sugar and water, for a beverage and for flavoring liquors. The name 'citron' is also applied, in the United States, to a variety of melon resembling in appearance the watermelon, but having a firm, white, inedible core. The rind of this melon is used for preserves, like that of the true citron. See Citrus; Orange; Lemon. For illustration, see Colored Plate of Citrus Fruits.

CIT′RONEL′LA (Neo-Lat., dim. of Med. Lat. *citro*, citron, from Lat. *citrus*, citron). The name of a fragrant ethereal oil imported from Ceylon, and used by perfumers. Under the name of *Idris Jaghi*, it is often employed as an adulterant of certain aromatic oils.

CITRONELLE, sĭt′rô-nĕl′. A village in Mobile County, Ala., 30 miles north by west of Mobile, on the Mobile and Ohio Railroad. Here, on May 4, 1865, after receiving news of Johnston's surrender to Sherman, Gen. Richard Taylor surrendered to Gen. E. R. S. Canby the last Confederate army east of the Mississippi. Population, in 1900, 696.

CITRON-MELON. See Watermelon.

CITRON WOOD or **CITRUS WOOD.** The most costly furniture of Roman antiquity was made from this wood, which is probably the *Callitris quadrivalvis*—a tree of the pine family, still employed in cabinet-making on account of its beautiful grain. It grows in Algeria and has large and gnarled roots from which the pieces used for ornamental purposes are taken.

CITRUS (Lat., citron-tree). A genus of plants of the order Rutaceæ, consisting of thirty or more species of trees and shrubs, most of which bear spines or thorns and are natives of India and other warm parts of Asia, but many of which are now commonly cultivated in all warm climates on account of their fruit. This genus includes the orange, citron, lemon, lime, bergamot, shaddock, pomelo, and forbidden fruit (qq.v.). Citrus-trees are distinguished by numerous stamens, irregularly united in bundles by their filaments—a pulpy fruit, with a spongy or leathery rind and smooth seeds. The leaves and the rind of the fruit abound in volatile oil. The flowers also contain volatile oil and emit a peculiar fragrance.

CITRUS DISEASES. See Orange, paragraph *Orange Diseases*.

CITTADELLA, chêt′tȧ-dĕl′lȧ (It., little city, dim. of *città*, city). A city in North Italy, Province of Padua, situated 14 miles northeast of Vicenza (Map: Italy, F 2). It has a beautiful church and botanical gardens, and manufactures of cotton and woolen goods. It was founded in 1220, as a protection against Treviso, and has still retained its walls, tower, and moat. Population, in 1881 (commune), 9087; in 1901, 9886.

CITTÀ DI CASTELLO, chĕt-tä' dē kȧs-tĕl'lō (It., City of the Castle). A city in the Province of Perugia, Central Italy, situated near the left bank of the Tiber, 20 miles east of Arezzo (Map: Italy, G 4). It is surrounded by walls dating from the beginning of the sixteenth century, and contains a number of magnificent palaces, including several belonging to the Vitelli, the lords of the city during the fifteenth and sixteenth centuries. The cathedral, a Renaissance structure, completed in 1540, has a campanile and a carved portal belonging to the original Romanesque building of 1012. The town-hall, dating from the fourteenth century, is a splendid building and contains a fine collection of Italian paintings and other objects of art. Although some of the first church pictures of Raphael were painted for Città di Castello, the town does not possess any originals of the master in its public collections. The chief manufactured products are silk and nails. Its commerce is of some importance. Città di Castello is the seat of a bishop, and occupies the site of Tifernum Tiberinum, destroyed by Totila. Population, in 1881 (commune), 24,002; in 1901, 26,439.

CITTANOVA, chĕt'tä-nō'vȧ. A town in the Province of Reggio, Calabria, Italy, 31 miles northeast of Reggio. It arose from the ruins of Casalnuovo, which was destroyed by an earthquake in 1783. Its present name dates from 1852. The cultivation of olives and manufacture of olive oil constitute its chief industry. Population, in 1901 (commune), 11,713.

CITTÀ VECCHIA, chĕt-tä' vĕk'yȧ. Former capital of Malta, 6 miles west of Valetta.

CITY (Fr. *cité*, Lat. *civitas*). In the United States, a chartered municipal corporation whose chief executive officer is usually known as the mayor. The legislatures of the various States have prescribed different requisites for the granting of city charters, the principal condition being that in respect to population. City charters vary in the degree of power they confer on the municipal authorities, the measure of local autonomy being usually, though not always, regulated by the number of inhabitants. Besides the mayor, there are, as a rule, a board of aldermen and a common council. In Great Britain the term city is generally applied to an incorporated cathedral town—i.e. one which is, or has been, the seat of a bishop or the capital of his see. In the sense in which it was first used in the Romance languages of modern Europe, the word 'city,' like its Latin original and the Greek πόλις, was probably equivalent to State (*respublica*), rather than to town or borough (*urbs municipium*): and while the latter signified a collection of hearths and households, governed by municipal laws internally, but subject externally to the laws of the country of which it formed a part, the former was applied only to such towns as, with their surrounding districts, were independent of any external authority. The only cities in this sense now are the free towns of Germany, and such of the cantons of Switzerland as consist chiefly of a town and its surroundings, as Geneva. The ancient Gauls, though composing one nation, were divided into tribes, living in different cantons, each with its town, to which the term '*civitas*' was applied; and as they also acknowledged a species of central authority, several cities sending delegates to a central one of greater extent and importance to discuss their common affairs, there is reason to believe that the term 'city' was applied, *par excellence*, to those central places of meeting, and thus, from a very early period, signified a capital or metropolis, though not independent. See CITIZEN.

POLITICAL AND COMMERCIAL ASPECTS. The city has always been the centre of commercial and industrial development, but its origin is to be found among agricultural peoples, who possessed the fertile lands and built themselves walled towns, or took possession of some naturally fortified places, such as the Acropolis of Athens, in order to protect themselves from the attacks of the predatory tribes. Within the city, handicraft, exchange, and various industries grew up. Babylon and Egypt were full of these small communities, now buried beneath the sand. They were situated on rivers and the seacoast, and soon became centres of commerce. Large cities were a prominent feature of the ancient world; Thebes, Memphis, Babylon, Nineveh, Susa, Tyre, Carthage, and Jerusalem were great centres. Greece, for its extent and population, had many large cities. Alexandria is said to have contained over 500,000, and Rome was still larger. As capital of the Empire of the East, Constantinople succeeded Rome as the principal city in Europe. Civilization was associated with city life, as was illustrated by the use of the word 'pagan' (Lat. *paganus*, dweller in a country district, where heathenism often survived much longer than in the city). In the Mohammedan East, during part of the Middle Ages, Bagdad, Damascus, and Cairo led in population, while Cordova was the greatest city of the Mohammedan West and for a time of all Europe. Compact cities grew up in the Middle Ages in nearly every European country. At the beginning of the sixteenth century, Europe had six or seven cities numbering 100,000; at the end, thirteen or fourteen. During the seventeenth century, while civil war prevailed, although the population of Europe remained stationary, the cities increased. The total population increased greatly in the eighteenth century.

A remarkable fact of the nineteenth century has been the constant increase in urban life at the expense of the rural districts. Cities have grown absolutely and proportionally in respect to the total population. This is almost universally true. Naples, Budapest, Athens, Bucharest, Russian cities, South American cities, and even Jerusalem, Cairo, and Damascus may be included. The tendency toward city life is noticeable in agricultural Australia. England was the first country to recognize the new grouping of population, and to adopt means to meet its dangers. The seaports and cathedral and country towns were suddenly left far behind by the new manufacturing towns, many of which had no corporate existence in 1835. In 1851, 50.08 per cent. of England's population was urban; in 1891, 72.05 per cent. In Scotland the change has been revolutionary. In 1801, of the 1,600,000 inhabitants, few resided in towns; in 1891, out of over four million, only 928,500 were strictly rural. Almost the entire increase of population in France within the last half-century has been in the cities. In 1891, 37.4 per cent. of the people were found in cities, while the rural population had actually decreased. The recent growth of the German cities is almost unexampled. Forty-seven per cent. of the population now live under urban conditions. The tendency toward city life is especially marked in Prussia and Saxony. Statistics for other Continental countries are equally interesting. In the United States a diffusion of the population would have seemed natural; but urban tendencies are becoming stronger, as will appear from the following table:

YEAR	Total Population	Urban population—Cities of 8000 +	No. of places	Percent. of urban total
1790..............	3,929,214	131,472	6	3.4
1850..............	23,191,876	2,897,586	85	12.5
1870..............	38,558,371	8,071,875	226	20.9
1880..............	50,155,783	11,318,507	286	22.6
1890..............	62,622,250	18,272,503	447	29.2
1900..............	75,468,039	24,992,199	545	33.1

Noticeable phenomena are the growth in the number of cities in agricultural States, such as Kansas and Nebraska, and along the Pacific Coast, and the remarkable increase from 1880 to 1890. The census of 1900 shows that an increase has taken place in the South-Central and Western States; that the North-Atlantic and North-Central States still contain four-fifths of the urban elements—a few States having over two-thirds of their population in cities; and that, since 1890, the percentage of urban increase has been 16 per cent. greater than that of the total population.

Throughout the world the remarkable growth of great cities is of special significance, and also the manner of growth. There is great difficulty in comparing statistics because of the failure to distinguish the economic from the political unit. It is the territory economically dependent upon the large centre which continues to grow rapidly. The important point to be noted is, that the increased size of these cities is due to suburban extensions. The older portions of the city have the population displaced by business and improvements; rapid-transit facilities remove the residential portions to outlying districts, where better conditions are possible, and the congested wards do not grow except where a low class of immigrants appear. However, the incomers to the slums are largely balanced by the outgoers. Certain forms of industry are also moving to the suburbs.

A principal cause of urban growth was the industrial revolution which stimulated the increase of population and concentrated it in large towns. It is noticeable that the tendency to city life in the different countries is coincident with the growth of manufacturing industries. An advantageous commercial situation is still a cause of growth for individual cities, as instanced by Liverpool, Montevideo, or Denver. More recent reasons for the depopulation of the country districts have been the low price of farm products; the improvements in agricultural machinery, which have reduced the demand for labor; the decreased demand for rural craftsmen, due to the factory products and improved transportation; and the varied opportunities for advancement afforded by the city.

A few of the effects of this agglomeration of population may be enumerated. (1) *Economic.* Great extremes of wealth are found in the cities, but the possibilities of greater production raise the average of prosperity and the standard of living. Increased taxation and municipal indebtedness make heavy demands upon the social purse. The cost of living is high, especially in rents, resulting in the horrors of overcrowding. Staples, however, are lower, and consumption can be greatly varied. The existence of an unemployed class is probably due to the immigration of a low class. Association is an aid to labor, in that it favors organization. (2) *Political.* Urban growth has meant national greatness. National stability was considered to depend upon the conservatism accompanying land-tenure. As urban life increases, tenancy becomes more general; but the new forms of wealth have simply expanded property interests. Municipal government (q.v.) presents difficult problems. The population contains floating, non-taxpaying, and foreign elements; the opportunities for corruption are many; and the needs of administration require an expansion in governmental functions. (3) *Social.* Among the evils of city life are those of disease, infection, dirt, high death-rate, infant mortality, overcrowding, lack of light and air, poor water, the fostering of daring criminals, the nervous tension of the life and the lack of provision for education and recreation, as well as the dangers of class antagonism. Industrial competition has weakened the tendency of cities to be the centres of radicalism, but association unconsciously strengthens social solidarity. A humanitarian movement is apparent, as instanced in philanthropic associations, while common interests have developed municipal activities broadly social in their nature. The cities are necessarily the centres of thought, culture, and progress; they make opinions, fashions, and ideas. Urban life must be accepted as a prominent factor of civilization, whose evils are temporary and remedial. Science can provide a solution for every problem. The old cities are in process of remaking; the solution of the problem is not a return to rural life, but a better adjustment to the urban environment. See MUNICIPAL GOVERNMENT.

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CITY HEIRESS, THE. A comedy by Mrs. Aphra Behn (1682), based upon Middleton's *A Mad World, My Masters.* The prologue was written by Otway.

CITY MADAM, THE. A comedy by Philip Massinger, licensed May 25, 1632, and printed in 1658. It was revived at Drury Lane, April 29, 1783. The doubt which has been raised as to its entire authenticity is unfounded.

CITY MATCH, THE. A comedy by Jasper Mayne, printed at Oxford in 1639, and produced the same year, first at Whitehall, London, before the King and Queen, and then at Blackfriars. It was republished in 1659, and was revised for the stage by Bromfield, in 1755, under the title of *The Schemers*, and by Planche, in 1828, under the title of *The Merchant's Wedding*. It is a clever though rather involved piece, criticised by Pepys as 'silly.'

CITY MOUSE AND CANTERBURY MOUSE, THE. An old fable of a country mouse invited to the home of a mouse in the city, where, while feasting on unaccustomed dainties, she is terrified by the onslaught of a cat, and is led to esteem the security of her frugal life in the fields more highly than the town luxuries with their attendant perils. The fable is a satire by Matthew Prior (1687) on Dryden's *Hind and Panther*.

CITY NIGHTCAP, THE. A play by Robert Davenport, licensed for the stage in 1624, though not printed until 1661. Ten years later, an adaptation of the play, by Mrs. Aphra Behn, appeared under the title, *The Amorous Prince*. It is included in Dodsley's *Old Plays* (1740).

CITY OF A HUNDRED TOWERS. An appellation of Pavia, Italy, from its many towers and steeples.

CITY OF BROTHERLY LOVE (Gk. *φιλαδελφία*, *philadelphia*, from *φίλος*, *philos*, dear + *ἀδελφός*, *adelphos*, brother; confused with *Φιλαδελφία*, *Philadelphia*, a city in Asia Minor, named after Attalus *Philadelphus*). The English rendering of the two Greek words composing the name *Philadelphia*, whence it is used as an occasional appellation for that city. The name was originally given by William Penn.

CITY OF CHURCHES. A name given to Brooklyn, N. Y., on account of the large number of its churches.

CITY OF DAVID. Jerusalem, which David took from the Jebusites and made the capital of his kingdom. The term is applied also to Bethlehem, where David is supposed to have been born.

CITY OF DESTRUCTION, THE. The city from which Christian begins his journey to the Celestial City, in Bunyan's *Pilgrim's Progress*. It represents the state of worldliness.

CITY OF DREADFUL NIGHT, THE. A poem by James Thomson, published from March to May in the *National Reformer*, in 1874. It was published in a collection of his poems (London, 1880). An American edition appeared in 1892. It is a mystically pessimistic work, describing the author's descent into a city of black hopelessness, whose denizens find no consolation, even in the thought of the transiency of earthly sorrow and pain.

CITY OF ELMS. A name given to New Haven, Conn., from the fine elm-trees on the Green and along the older streets of the town.

CITY OF GOD (Lat. *De Civitate Dei*). See AUGUSTINE, SAINT.

CITY OF HOMES. An appellation of Philadelphia, from its large number of dwelling-houses.

CITY OF MAGNIFICENT DISTANCES, THE. A term applied once somewhat derisively, but now proudly, to Washington, D. C. The city was laid out at the end of the eighteenth century on so grand a scale that the belief was strong that it would never realize the ideal of its founders.

CITY OF OAKS. A name for Raleigh, N. C.

CITY OF PALACES. A name for Calcutta.

CITY OF REFUGE (Heb. *'īr miglat*). A town reserved as a temporary asylum for homicides fleeing from the vengeance of the avenger of blood. The phrase refers particularly to the Jewish form of the right of asylum, which has existed, in most primitive societies, as a device for mitigating the excesses of private vengeance and for securing some form of legal inquiry into the offense charged. Such asylum, sanctioned and protected by law, is clearly a survival from the protection which the man-slayer sought and found in his own family or tribe, early law permitting the *lex talionis*, or right of retaliation, on behalf of the injured family or tribe, so long as the malefactor was at large. Asylum once having been gained, the responsibility for the crime was transferred to the community protecting the wrong-doer, the compensation due being a money payment, the amount of which was regulated by law.

According to biblical law, there were six cities in which any one who committed murder unintentionally could find an asylum (Num. xxxv.). Three of these cities—Bezer, Ramoth in Gilead, and Golan in Bashan—were east of the Jordan: the other three—Kedesh in Galilee, Shechem, and Hebron—were to the west. If the murderer reached any of these cities, he was safe from the blood-avenger (Num. xxxv. 12; Deut. iv. 41-43; Joshua xx. 2-9; Ex. xxi. 13; Deut. xix. 4-10). While the Law itself, in its present form in the Book of Numbers, belongs to the post-exilic period, there are certain features of it which are unquestionably more ancient. The three refuge cities to the west of the Jordan are all ancient sanctuaries, and were probably, from a much older period even than the Hebrew conquest of Palestine, asylums under the protection of the deities worshiped in the places named. The city of refuge is thus an institution growing out of the ancient custom, widely prevalent, which made every sacred spot, every altar as the resting-place of a deity, a place of refuge, within whose domain even animals were safe from the attacks of man. The oldest Hebrew legislation (Ex. xxi. 12-14) recognizes this law of asylum, while excluding from its protection the willful murderer, who is to be seized even at the altar of Jehovah (Ex. xxi. 14). Since it was the purpose of the religious reforms instituted by King Josiah (q.v.) to recognize the sanctity of only one sanctuary—that of Jerusalem—the asylums connected with the numerous sacred places naturally lost their force. Accordingly, to overcome the difficulty involved in obliging a murderer in any part of the country to flee to Jerusalem, the six cities above mentioned were recognized as places of refuge, with eventual provision of three more in Philistia, Phœnicia, and Cœle-Syria (Deut. xix. 8-10). In the legislation in Numbers (chap. xxxv.), which is later than Deuteronomy, further provision is made: (1) The murderer is not to go unpunished, but is to be taken from his asylum to be tried in public, in order to check lawlessness, which prevailed through the survival of the blood-feud customs to a late day; (2) the man-slayer who had been acquitted was safe, upon the death of the high-priest in whose time the murder was committed, to return to his home. All privileges of the blood-avenger ceased with the death of the high-priest, and any violence on the part of the blood-avenger would be regarded as willful murder; whereas, previous to the death of the high-priest, the manslayer, even after acquittal, had to be on his guard, and if slain by the blood-avenger, his death could not be punished. It is doubtful whether the system provided for in Numbers was ever actually carried out, though in the days of Greek and Roman supremacy many cities of Syria enjoyed special privileges as asylums, and according to Josephus (Antiq. xiii. 2, 3) Jerusalem was included in the number. Consult Förster, *De Asylis Græcorum* (Berlin). See, also, Asylum, Right of; Blood-Feud; Blood-Money.

CITY OF THE PLAGUE, The. A poem by Professor John Wilson ('Christopher North'), published, with others, in Edinburgh (1816). It is a descriptive poem, partly founded on Defoe's *Journal of the Plague in London*. At the time of its appearance, it received favorable criticism by Jeffrey, in the *Edinburgh Review*.

CITY OF THE PROPHET (Ar. *Madīnat an-Nabī*). An appellation of Medina, Arabia, where Mohammed took refuge in the year 622, fleeing from Mecca.

CITY OF THE STRAITS. A name given to Detroit, Mich., from its position on the Detroit River, connecting Lake Saint Clair and Lake Erie.

CITY OF THE SUN, The. A name given to Baalbec, which was built on the ruins of Heliopolis ('The Sun City').

CITY OF THE VIOLATED TREATY, The. A name given to Limerick, Ireland, from the repeated violations of the treaty made October 3, 1691, after its surrender to the English and Dutch forces.

CITY OF THE VIOLET CROWN, The. A name applied to Athens.

CITY OF VICTORY (Ar. *Misr al-Qāhirat*). A translation of the Arabic name for Cairo, the capital of Egypt.

CITY POINT. A village in Prince George County, Va., 10 miles northeast of Petersburg; on the James River and on the Norfolk and Western Railroad (Map: Virginia, G 4). It has a trade in brick, lumber, and phosphates, and is of considerable historical interest. Here, in 1864, General Grant made his headquarters, and in his subsequent operations the city was used by the Federal army as its principal landing-place and depot for supplies. Population, about 1000.

CITY POLITIQUES, pŏl'ĭ-tēks'. A satirical comedy, probably printed for the first time in 1683, and produced at the King's Theatre, London, the same year. It is a sharp attack on the contemporary Whig faction, especially on Oates, in the character of Dr. Panchy. Only the King's protection kept it from being suppressed by the victims of the satire. Some authorities place the date of publication as early as 1675.

CITY RAMBLE, The; or, The Playhouse Wedding. A play by Elkanah Settle, printed in London in 1711, and produced at the Drury Lane Theatre, August 17, 1711. It is partly founded on Beaumont and Fletcher's *Knight of the Burning Pestle* and *The Coxcomb*.

CITY WIT, The; or, The Woman Wears the Breeches. A comedy by Richard Brome (q.v.).

CIUDAD BOLIVAR, sē′o͞o-ᴅäᴅ′ bô-lē′vär (Sp., 'city of Bolivar'). The capital of the State of Bolivar, Venezuela, on the right bank of the Orinoco, about 240 miles from its mouth (Map: Venezuela, E 2). It is situated at a narrow point of the river, only 185 feet above the level of the sea, and is well built, having spacious, handsome buildings. Of these the more notable are the palace of the Governor, the college, the market, the cathedral, and the theatre. There are several fine monuments in the Plazas Bolivar and Guzman Blanco and in the cemetery. The city is the seat of a bishop. Owing to its position on the Orinoco, Ciudad Bolivar is an important commercial centre, now ranking among the four largest ports of Venezuela. Its chief export is coffee; but rubber, cattle, hides, sugar, and asphalt also are exported in considerable quantities. Population, in 1891, 11,686. Ciudad Bolivar was founded in 1764, and was known as Angostura until 1819, when the Congress met which, under the inspiration of Simon Bolivar, formed the new Republic of Colombia out of the States of Venezuela and New Granada. Since then the city has borne his name.

CIUDAD DE LA FRONTERA, dā̇ lȧ frôn-tā′rȧ (Sp., the frontier city). (1) The name of a town at the mouth of the river Tabasco, in Southern Mexico. (2) The old Spanish name for the town of Chachapoyas, Peru.

CIUDAD DE LAS CASAS, dā̇ lȧs kä′sȧs. See San Cristóbal de los Llanos.

CIUDAD DE LOS REYES, dā̇ lôs rā′yȧs (Sp., 'city of the kings'). The name given by Pizarro to the present city of Lima, Peru, when he founded it, in 1535, on the banks of the river called, by the Quichuan (Peruvian) Indians, 'Rimac,' meaning 'The Babbler' (literally, 'one who talks'). The Spaniards found difficulty in pronouncing the word, and 'Rimac' became first 'Limac' and finally 'Lima.'

CIUDADELA, thē′o͞o-ᴅȧ-ᴅä′lȧ (Sp., little city, dim. of *ciudad*, city). A seaport town of the Spanish island of Minorca, situated on the west coast. It is walled, has a cathedral and several convents, and in its vicinity are found a number of caves. Population, in 1887, 8447; in 1900, 8645.

CIUDAD JUAREZ, sē′-o͞o-ᴅäᴅ′ ʜo͞o-ä′rĕth (Sp., city of Juarez). A city in the State of Chihuahua, Mexico, on the Rio Grande, opposite El Paso, Tex., and on the Mexican Central Railroad (Map: Mexico, F 2). It is situated at an altitude of 3800 feet above sea-level, in a fertile district, devoted to agriculture, stock-raising, and fruit and vine cultivation. The city has a Mexican army-post, custom-house, and a statue of Juarez. It is the residence of a United States consul. Ciudad Juarez was formerly known as El Paso del Norte. Population, about 7000.

CIUDAD PORFIRIO DIAZ, pôr-fē′rē-ō dē′äth. A town in the State of Coahuila, Mexico, on the Rio Grande, opposite Eagle Pass, Tex., and on the Mexican International Railroad (Map: Mexico, H 3). It is the Mexican terminus of the international bridge across the Rio Grande, and has a Mexican army-post and a custom-house. It is the residence of a United States consul. The town is the centre of an agricultural, stock-raising, and fruit-growing region, and carries on an extensive international trade. Coal is found in the vicinity. Ciudad Porfirio Diaz was founded in 1849, and derives its present name from the President of the Republic. The town was formerly called Piedras Negras. Population, about 5000.

CIUDAD REAL, thē′o͞o-däd′ rä-äl′ (Sp., royal city). A town of Spain, capital of the province of the same name, in New Castile, situated in a fertile plain between the rivers Guadiana and Jabalón, about 100 miles south of Madrid (Map: Spain, D 3). It is surrounded by walls, is the seat of a bishopric, and has some notable edifices, including the municipal building, the parish church of Santa María del Prado—a massive Gothic structure, with a fine interior—and several monasteries and hospitals. There are manufactures of coarse woolens, linen, olive-oil, flour, leather, etc.; also a trade in the agricultural produce of the district, which is engaged in raising stock, particularly mules, and bulls for the ring. An annual fair is held. Population, in 1900, 15,327.

Ciudad Real was founded by Alphonso X., after the middle of the thirteenth century, as a fortress against the Moors, and soon attained considerable importance from the privileges granted by its founder. In 1809 the town was the scene of a Spanish defeat by the French, under Sébastiani.

CIUDAD RODRIGO, rō-drē′gō (Sp., city of Rodrigo). A fortified town of Spain, in the Province of Salamanca, near the Portuguese frontier (Map: Spain, B 2). It is situated on an elevation above the river Ciqueda, which is here crossed by a fine bridge, and has a cathedral of considerable architectural interest, the earliest portion of which dates from the close of the twelfth century, three Roman columns, and remains of an aqueduct. The manufactures include soap, leather, linen, woolens, etc. The town is the seat of a bishop. Population, in 1900, 8007.

In the War of the Spanish Succession Ciudad Rodrigo was taken by the English in 1706, and recaptured by the French in the following year. In July, 1810, the French, under Masséna, captured it; but in January, 1812, it was retaken by the British, under Wellington.

CIUDAD VICTORIA thē′o͞o-däd′ vĭk-tō′rē-ȧ (Sp., city of victory). The capital of the State of Tamaulipas, Mexico, 160 miles southeast of Monterey (Map: Mexico, J 6). It is finely situated on the eastern slope of the great plateau, and is the centre of a sugar-growing district. It is the see of a bishop and the residence of a United States consular agent. Ciudad Victoria dates from 1750, but not until 1825 was its present name adopted. Population, in 1895, 14,575.

CIVET (Fr. *civette*, from MGk. *ζαπέτιον*, *zapetion*, from Ar. *zabad*, *zubad*, civet, from Pers. *zadab*, froth of water). A genus (Viverra) of carnivores of the Old-World family Viverridæ, connecting the cats with the hyenas, and having the body elongated in some of the species as much as in the weasel tribe; the head is also long and the muzzle sharp. The ears are short, broad, and rounded. The feet have five toes, and the claws are only semi-retractile. There is a more or less conspicuous erectile mane along the back, as in hyenas. Near the sexual organs, in both sexes, there is a large double pouch, in which is secreted an odoriferous, fatty substance, called 'civet,' much used in compounding perfumes. There are several species of civet, of which the best known is the common or African civet (*Viverra civetta*) of northern Africa, from two to three feet long, brownish-gray, with numerous black bands and spots. The civet preys on birds, small quadrupeds, and reptiles, and is regarded as a benefactor along the Nile, on account of its appetite for crocodile's eggs. It is very commonly kept in confinement for the sake of its perfume, which is removed from the bag about twice a week by means of a small spatula, and is obtained most abundantly from the male, especially after he has been irritated. A dram is a large quantity to obtain at a time. After being cleaned of hairs, washed, and dried, civet is ready for the market, and is worth from $10 to $12 an ounce, if pure. About 20,000 ounces are imported into London annually, and this represents a large part of the total product. The civets kept for the purpose of providing perfume are fed on raw flesh; the young partly on farinaceous food. The principal source of supply of commercial civet is northern Africa, especially Abyssinia. Several other species of civet occur in southeastern Asia and in the East Indies, all handsomely striped or spotted. The linsang and the binturong are most prominent among these.

The 'American civet-cat' is the cacomistle (q.v.).

Compare ICHNEUMON; MUNGOOS.

Fossil remains of the genus Viverra have been found in those deposits of the Tertiary Era that lie above the Middle Eocene. They show no considerable variation from their modern descendants. The remains of other extinct allied genera from the Tertiary show interesting relations between the early members of the family Viverridæ and the hyenas. See VIVERRIDÆ.

CIVIALE, sē′vē-äl′ JEAN (1792-1867). A French surgeon, born at Thiézac, Cantal. He is remembered for his discovery of the operation of 'lithotrity' for the removal of stones from the bladder without the loss of blood. For this discovery he was awarded a prize of 6000 francs by the Academy, in 1826. His publications include: *Parallèle des divers moyens de traiter les calculeux* (1836-37); *De l'urétrotomie* (1849); *Résultats cliniques de la lithotritie pendant les années 1860-64* (1865); and *La lithotritie et la taille* (1870).

CIVIC CROWN (Lat. *corona civica*). One of the most highly valued honors that a Roman could obtain. It was given for saving the life of a citizen in battle or assault, and was voted by the Senate to the Emperor Augustus as *servator civium*. The civic crown was merely a wreath of oak leaves, with pendant acorns. The one to whom it was given had the right to wear it always. When he appeared at the games all rose to do him honor, and he was entitled to a seat next to the senators; he was also excused from all troublesome duties and services, with the same immunities for his father and his father's father.

CIVIDALE DEL FRIULI, chē'vê-dä'lâ dĕl frê-ōō'lê (probably from ML. **civitalis*, from *civitas*, town). A city in northeastern Italy, in the Province of Udine, near the Austrian border, about 10 miles east by north of the city of that name, with which it is connected by rail (Map: Italy, H 1). The picturesque Natisone, which flows through the city, is spanned by a fifteenth-century bridge. A cathedral of the same age contains an 'often-restored' bapstistery of the eighth century, and among its archives a translation of the Gospels by Saint Jerome, written in the fifth century, a tenth-century psaltery, and many other valuable manuscripts and art treasures. In the museum are many Roman and Lombard antiquities. Cividale was for many years the residence of Lombard dukes. The modernized city has a military training-college, and silk, cotton, and linen factories. Population (commune), in 1881, 8205; in 1901, 9061.

CIVIL ACTION (Lat. *civilis*, from *civis*, citizen). Any judicial proceeding involving a controversy between individuals in regard to their private matters, distinguished from proceedings where public interests are concerned, as in a criminal prosecution. Civil actions include the procedure in a court of chancery or equity, and also those cases in which the State submits to an action by an individual. See ACTION; PROSECUTION.

CIVIL ADMINISTRATION. In the most general sense, equivalent to public administration—the conduct of the affairs of the State, or Government, or of any subordinate division thereof. In a more restricted sense, the term is frequently employed to describe the management of the municipal or non-military concerns of the State; and sometimes, more narrowly, as referring to the executive and judicial departments of the Government, as distinguished from the legislative. See ADMINISTRATION; and compare ADMINISTRATIVE LAW.

The principles and the methods of civil administration vary greatly, from the simplicity and flexibility of patriarchal government or other personal autocracy, to the rigidity of a modern bureaucratic system, like that of France and Russia, and the complexity of a highly developed political system, like that of Great Britain and the United States. There is a general similarity among modern civilized States in the organization and working of the central administration. The great departments of State—those having to do with foreign affairs, with the army and navy, with the collection and disbursement of national revenue, with commerce and industry, and with the post-office—present no great diversity, either in functions or in organization. The chiefs of these departments are ministers of State, the principal and authorized advisers of the Executive, or, as in Great Britain, constitute the real Executive. (See CABINET.) Usually these chiefs are political and therefore temporary officers, who may come and go without greatly modifying the organization and methods of their departments. Their influence is great while it lasts, but is short-lived; the permanent policy of the administration, as well as its methods and personnel, being for the most part determined by permanent officials of great experience, known as under-secretaries, assistant secretaries, bureau chiefs, etc. As these permanent officials are the persons who really conduct the work of administration, so they are, in everything but the political sense of the term, responsible for the proper conduct of the affairs of their respective departments, and, being so, they are usually unfettered in the choice of their subordinates.

In other matters, however, especially in those of purely domestic concern—as the administration of justice; the maintenance of the public peace; the supervision and control of religion, of morals, and of public education; the levying and collection of taxes, direct and indirect; the conduct of elections, and the 'internal affairs' generally of the community—there is as great diversity in the organization and methods of administration as there is in the political character and ideals of the several States. In those countries in which the feudal and monarchical tradition is strongest, whatever the form of the government may be, not only is the civil administration most highly centralized, but it is much further-reaching, more searching and obtrusive than in those countries which have more completely emancipated themselves from that tradition. This is as true of republican France as of monarchical Germany and autocratic Russia. In the free governments, on the other hand—as in the United States, Great Britain, and her self-governing colonies—not only is the administration decentralized, and left, as largely as possible, in the hands of local self-governing groups, but the general administration is rigidly confined to matters of general or national concern, and is not permitted to trench upon the local concerns of the subordinate political groups of the State. In these countries, accordingly, such matters as the building and repair of roads and bridges, and the maintenance of an adequate constabulary or police force, are dealt with by the borough, parish, town, or city, and not by the State; while, in the United States, even the matter of public education, which is conceded to be an affair of State, and is usually governed by State statutes, is, for the most part, turned over to the locality concerned—the city or school district—for administration.

While in no modern civilized State is the administration wholly centralized, or, on the other hand, wholly decentralized, the two systems are, in their principles and methods, if not in their actual embodiment in practice, so sharply discriminated as to call for a few words of comparison. Doubtless a centralized administration is capable of a much higher degree of efficiency than is attainable under the other system. For matters of great moment, requiring time for their maturing, and, when ripe, calling for prompt and decisive action, it is indispensable. No government would think of employing any other system in its military and international affairs. Then, too, it achieves a certain uniformity and regularity of action, and thus tends to strengthen the established government by giving its administration an impersonal effect of permanence and solidity. On the other hand, these very qualities of regularity and uniformity of action tend to harden into the inflexibility and routine of bureaucratic system, which, being lifted above public opinion and free from any effective criticism, crystallizes its abuses in the form of hallowed customs, and lends itself too easily to oppression.

The virtues of the system of decentralization are political rather than administrative. It is only under this system that a free government has free play for its varied activities and experiments. And, though its potential efficiency is not to be compared with that of the system of centralization, it has much to recommend it from the purely administrative point of view. While not adapted to the regulation of international relations, or the carrying out of far-reaching measures of policy, its responsiveness to public opinion makes it an efficient agency for supervising and controlling the far more numerous and important private and local interests of the community. Being local and familiar, it is vigilant and sympathetic; and though some of the affairs committed to it may be badly administered, it is probable that the sum-total of its achievement is greater than that of a centralized administration, with its limited knowledge and its indifference to criticism.

The character of the public administration—whether efficient or inefficient, economical or wasteful, pure or corrupt—depends fundamentally on the conception of the proper aim and purpose of government which prevails. Extravagance and corruption, and, with them, the inefficiency they engender, flourish under any government, whether popular or autocratic in form, which is maintained for the benefit of the ruler, whether that be a king, an aristocracy, or a political party. And, on the other hand, the honest acceptance of the principle that government is instituted for the benefit of the governed tends to produce clean and efficient administration, whatever the external form of the State. It is doubtless to the persistence of the feudal conception of the State that we owe the long era of corrupt and, upon the whole, inefficient administration of public affairs which has marked the history of modern States. So long as the executive head of the State is at once the supreme land-owner and the lord paramount, from whom all honor and protection are derived, so long will the offices of administration be regarded as his perquisites, and the treasure derived from taxation of the people be expended for the gratification of his ambitions and those of his favorites. He may, of his favor, or for his own purposes, grant a certain measure of efficient administration; but the extravagance and corruption which are inseparable from that system will destroy the efficiency of the government as well.

The profound modification of the theory of government effected by the democratic movement of the eighteenth and nineteenth centuries, in substituting the welfare of the people at large for that of the governing classes as the end and aim of government, has brought about a corresponding revolution in its administration. This change became apparent in England upon the accession of William of Orange to the throne in 1688, and in France a hundred years later, in the Revolution; but owing to the development of party government in the former country, and the excesses to which that system led, it did not become effective there until the middle of the last century. It is true that more than one administrative reform had been accomplished in Great Britain—as in the provision of Magna Charta, requiring all justices, constables, sheriffs, and bailiffs to have knowledge of the laws of the realm; the statute of Edward VI. (1552) forbidding the sale of offices (except the higher judicial offices); and the extraordinary law enacted in the twelfth year of Richard II. (1388), declaring that "none shall obtain office by suit, or for reward, but upon desert;" yet as late as the period of the American Revolution the 'spoils system' of the distribution of public office as the reward of party service flourished unchecked. In the United States that vicious system did not come into existence until the administration of President Jackson, and it is only now giving place to the system prefigured in the statute of Richard II., above referred to. (See Civil-Service Reform; Merit System.) The more recent development of party government in France has lately fastened the spoils system on the administration of that country; but, upon the whole, in Europe as well as in America, civil administration has been enormously improved, in purity and economy as well as in efficiency, during the last hundred years; while in England and many of the English colonies, and in considerable portions of the administrative system of the United States, it has completely emancipated itself from the taint of corruption and extravagance. (See Government.) For a comparison of administrative systems and methods of controlling officers of administration, see Goodnow, *Comparative Administrative Law* (2 vols., New York, 1893). Consult, also, Eaton, *Civil Service in Great Britain* (New York, 1880).

CIVIL CHURCH LAW, American. The body of law which defines the ecclesiastical function of the State, and maintains the civil status of the religious bodies within the United States. The status of the American churches is without a parallel in Christendom, in that in no other State do all organizations for the purposes of religion bear exactly the same legal relation to the civil authority. This body of law has been developing during the life of the American people as a nation, and has become one of the fundamental principles of their political philosophy. It is to be found (1) in provisions of the Federal and State constitutions; (2) in statute legislation; (3) in the decisions of the State and Federal courts, which now include about one thousand leading cases in these matters.

The Ecclesiastical Function of the American State. Although there is within the United States no church or churches by law established, yet the American State has an ecclesiastical function to perform. Formulated in its briefest terms, this ecclesiastical function is to cause it to be legally possible and also convenient for all residents, whether citizens, subjects, or aliens within the jurisdiction of the American governments, to sustain voluntary ecclesiastical relations. In other States, it is regarded as a proper function of the civil power to provide for definite ecclesiastical relations: and the aggregate of those relations so specifically provided for is regarded as constituting an ecclesiastical establishment. In either case, the civil power has an ecclesiastical function; but the difference in the two concepts is this, that the development of the individual's sphere of speech and action has in the American State completely included the sphere of speech and action for all purposes of religion, and has correspondingly altered the nature of the ecclesiastical function of the State, which, however, is none the less real because of such alteration. Such a function of the Government is no mere philosophical abstraction, but is a working institution, which has been in successful operation for more than a century. It has been carried wherever there has been an expansion of American sovereignty, and has been made to meet new conditions among new peoples, and has been so applied as to maintain its principles intact, and has everywhere produced substantially the same civil status for the churches.

History of Civil Church Law. Like other successful procedures, the separation of Church and State, and the equal status of churches, were not planned in detail and put into operation, but developed gradually under the force of public opinion. At the outbreak of the American Revolution, the Colonies were divided ecclesiastically into three groups. In one group, consisting of New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, and Georgia, the direct establishment of the communion of the Church of England was more or less complete in law. In the second group of Colonies, consisting of Massachusetts, New Hampshire, and Connecticut, the Congregational form of ecclesiastical organization, on the basis of the town and 'poll' parish, was established in law and in fact. In the third group of Colonies, consisting of Rhode Island and Pennsylvania, no ecclesiastical establishments had been developed, either in law or in fact. As a result of political revolution, the direct establishments by royal authority were nullified in law. The indirect establishments in the New England Commonwealths, built upon provincial legislation and local administration, remained undisturbed for some years. There remained, as survivals of the direct establishments, a number of incorporated parishes in New York and Virginia, and a few in other States; and, as remains of a still earlier establishment in New York, there were three or four incorporated Reformed Dutch churches that had received special protection by the Treaty of Breda, transferring the Province of New Netherlands to the British in 1667. During the Colonial Period, religious dissent had, with more or less vigor, resisted the legal Church establishments, and especially the system of compulsory taxation for the support of the clergy; and the overthrow of British sovereignty brought its opportunity. A demand developed very generally, even in the New England Commonwealths, but with stronger political backing in other sections, for a complete divorcement of political and Church affairs. There is evidence that the conditions were such that the politicians could not disregard this demand. At the formation of the Federal Government, religious liberty was secured to the people of the United States, so far as the action of the Congress was concerned, by the provisions of Chapter III., Article 4, of the Constitution, and the First Amendment. Both of these provisions were limitations upon the powers of Congress only; and neither the original Constitution nor any of the early amendments undertook to protect the religious liberties of the people against the action of their respective State governments. Religious affairs were included within the sphere of domestic relations, and were so left to the States to deal with. There were then inserted in the early constitutions of the several States the guarantees of religious liberty generally in the forms that we are familiar with. The development of the local peculiarities in the ecclesiastical institutions of the several States and sections of the country continued without interruption. The Colonial legislatures had granted a few charters of incorporation to local churches, and this practice was continued for some years by the State legislatures. It was, however, abandoned in time, because of the objection made by the political minorities, that the granting of such particular charters was special legislation, secured by political influence. At this period the American churches were beginning to revive from the exhaustion caused by the war, and were becoming the legal and equitable owners of property. Legal means for securing property to pious and charitable uses were sorely needed. Hence, a demand arose in several of the Middle States for a uniform procedure by which the local organizations of all religious bodies could secure a corporate form, with full control of their property. To meet this demand there were enacted a series of general statutes, beginning with that of New York, of April 6, 1784. An act of similar intent and of like provisions was passed, in 1793, by the State of New Jersey; and these two statutes became the models for similar laws in many of the Northern States. The provisions of these statutes were very meagre. No reference was made to particular ecclesiastical polities, except in the case of the Protestant Episcopal churches. The powers conferred upon the religious corporations so created were very limited, and nowhere were such corporations allowed to be self-perpetuating. Partiality to certain religious bodies was dreaded, and there was a very real fear that something might be done toward recreating an ecclesiastical establishment. The prevailing policy in legislation during the period extending through the third decade of the nineteenth century was based upon the idea that the civil power should treat all organizations alike, by doing as little as possible for any of them. The method of providing for the incorporation of religious societies by general statute has developed unequally in different sections of the country. As late as the year 1866, the States of Rhode Island, Virginia, and South Carolina had no such statute; and thirty years later, in 1896, a general statute of incorporation was still forbidden in the States of Virginia and West Virginia.

The third stage in the development of American civil Church law has been the result of specializing legislation in two directions. One form has been the discrimination between religious organizations proper and other social, educational, and philanthropic organizations. The second form of specialization has consisted in supplementing the general provisions of the statutes with optional provisions for corporations of particular denominations and polities. Through these supplemental provisions, there has been wrought into the statute law the recognition of purely ecclesiastical functionaries; and this is done most effectively by the creation of ecclesiastical corporations sole. There has developed a marked legislative cordiality toward the churches. At the beginning of the twentieth century, the policy is to treat all interests alike, by giving to each all that is asked. The early concept of religious organization in American law was naturally that of a simple and completely autonomous local society. To denominations whose type of polity corresponds to this concept, the legislation of the general statute era was satisfactory. The special optional provisions have, therefore, been enacted as a rule for the benefit of churches having polities by which the local bodies sustain definite relations to some more general authority, such as synodical and episcopal churches. At the present time, twenty-five distinct denominations have been thus specially legislated for. American religious corporations are not ecclesiastical corporations in the sense of the English law, but are merely private corporations not for profit. The constituent elements of these corporations vary all the way from the total number of church members to the corporation sole: as, for example, a presiding elder, bishop, or archbishop.

The Principles of Civil Church Law. In the course of the adjudication of the many causes that have arisen from ecclesiastical matters, the civil courts have developed the following as the basic principles of American civil Church law: (1) All ecclesiastical relations are voluntary, both in their inception and continuation. (2) The freedom of action for the purposes of religion is guaranteed to every one by the organic law, and is limited by the same law by the civil rights of others, and by all that is necessary for the purpose and good order of the State and for the protection of public morals. (3) No civil right can, in the eyes of the law, be impaired by an ecclesiastical relation. (4) The law of the land is a part of the law of the churches. (5) No law of the churches, when it is found to be in conflict with the law of the land, has any validity. (6) The civil courts are open for the adjudication of ecclesiastical causes when civil rights are involved. (7) The civil courts, when they assume jurisdiction of a cause, will accept the decisions of ecclesiastical tribunals, if such tribunals act according to the Church law, and do not exceed their jurisdiction. (8) The authority of the civil courts over all religious organizations is secured by the same means as in the case of private persons and secular organizations: judgments, decrees, and the issue of the writs of mandamus, information in the nature of quo warranto, prohibition, and injunction. (9) The principles of the law of charitable uses and of trusts, as modified by statute, are applied to property devoted to the purposes of religion. (10) The American clergyman, from the standpoint of the law, is a voluntary member of the association to which he belongs. The station is not forced upon him; he seeks it. He accepts it with all its consequences, and with all the rules and laws and canons then subsisting or to be made by competent authority. Such laws cannot, in any event, endanger his life or liberty, impair any of his personal rights, deprive him of property acquired under the laws, or interfere with the free exercise and enjoyment of religious profession and worship; for these are protected by the constitutions and laws.

The results of American civil Church law may be summed up in the language of the Supreme Court of the United States, in the case of *Watson vs. Jones,* 13 Wall. U. S., 639, as follows: "In this country, the full and free right to entertain any religious belief, to practice any religious principle, and to teach any religious doctrine, which does not violate the laws of morality and property, and which does not infringe personal rights, is conceded to all. The law knows no heresy, is committed to the support of no dogma, the establishment of no sect."

It is these principles of civil Church law that are to govern in all the relations of the civil power and the churches beyond the confines of the United States—in the insular possessions of the Hawaiian Islands, Porto Rico, and the Philippines.

CIVIL-DAMAGE ACTS. Statutes which have been passed in many of the United States, giving to those who sustain an actual injury by or through any intoxicated person, as a result of the intoxication, a right of action against the person who sold or gave away the liquor which caused the intoxication. In some States, this liability has been extended to the owner of the premises where the liquor was dispensed: and it is immaterial whether the liquor business is lawful in the particular jurisdiction or not. These statutes include injuries to person or property of any one, and loss of support, by wife or child, of a drunkard. Exemplary or punitive damages are allowed in some cases, but actual injury must also be proved. Where one in any way helps to bring about the intoxication, he cannot recover.

These statutes have been held constitutional, being within the 'police power' of the States under which the liquor traffic is regulated. See Temperance; Police Power; Prohibition.

CIVIL DEATH (Lat. *mors civilis*). The status of a living person who is deprived by law of his legal and civil rights.

The term is of feudal origin, and was introduced into the English law after the Norman Conquest. At that time civil death was one of the consequences of treason, banishment from the realm, abjuration of the realm (by which a criminal escaped other punishment by leaving the country forever), felony, and the act of entering upon a monastic life as a monk or nun: and in all of these cases, except felony, there was a total extinction of all civil rights, including loss of real and personal property, as if the person were physically dead. To avoid the effect of this, conveyances frequently made grants of estates for the 'natural life' of a person; and this phrase is used to-day in creating life estates, although the original reason for inserting the word 'natural' has ceased. Treason and abjuration of the realm involved forfeiture of property to the Crown as a penalty: but one taking monastic vows could make a will and appoint an executor to administer his estate.

In the United States, generally, civil death can occur only as the result of a sentence of imprisonment for life; but the doctrine is modified, so that there is only a partial extinction of the convict's rights, as in the New York statute providing that a sentence of life imprisonment shall operate as an absolute divorce of the felon from wife or husband; and in no case does his property descend to his heirs, as under the early law of England. The English law has also been greatly modified by statutes and decisions. For an annotation on civil death in the United

States, consult *Davis vs. Laning*, 18 Law Rep. Annot., 1882.

In some of the countries of Europe, the ancient doctrine is still applied in cases of persons entering a monastic life. See Attainder; Forfeiture; Outlawry.

CIVIL ENGINEER. See Engineer; Engineering.

CIVILIAN. This term has three meanings, which are distinct, though intimately related. (1) In a popular sense, it signifies a person whose pursuits are civil, i.e. neither military nor clerical. As a law term, it means, either (2) a person who is versed in the principles and rules in accordance with which civil rights may be vindicated in society generally, or in the particular State in which he belongs; or (3) one who has made a special study of these rules and principles as exhibited in the laws and government of Rome (the Roman civil law). The civil law of Rome exercised such an influence upon the formation of the municipal systems of almost all the States of modern Europe, that those who devoted themselves to its study were regarded as 'civil' or municipal lawyers *par excellence.* From the more learned training which this study demanded, civilian came often to be used as synonymous with professor or doctor, as opposed to practitioner of law, the former being generally more deeply versed in the Roman law than the latter; and this in its turn led to its being loosely applied to the international lawyers of the seventeenth century (Grotius, Pufendorf, etc.), who generally belonged to the class of civilians in the sense of Romanists, and who, though their subject was altogether different, quoted largely and derived many analogies from the Roman jurisprudence. At present, in the United States, from having no class of persons who prosecute law as a *science* as opposed to an *art*, the term 'civilian' has reverted to its narrower mediæval sense of student or teacher of the Roman civil law; and thus we speak of Savigny as a civilian, but not of Story.

CIVI'LIS, Julius (or **Claudius**). A chief of the Batavi, for twenty-five years connected with the army of Rome. Alienated by unjust treatment and by the execution of his brother, Julius Paulus, he headed an insurrection in Gaul in A.D. 69, but in A.D. 70 was subdued by an army under Cerealis, general of Vespasian. Tacitus extols his patriotism and heroic acts.

CIVILIZATION. In general, the condition of more advanced peoples in contradistinction to those classed as barbaric and savage. Specifically, that stage of human culture characterized by social organization based on the recognition of proprietary rights, especially in land; the third stage in human development. See Man, Science of.

CIVIL LAW. (1) The law applicable to the citizens (*cives*) of a particular State (*civitas*). The Romans used the term *jus civile* in this sense, distinguishing it from the law observed by all nations (*jus gentium*), and from the ideal law of nature (*jus naturale*). (2) The Romans also described their ordinary law, established by custom and by legislation, as their civil law, distinguishing it from the law introduced by the edicts of their magistrates very much as we distinguish common law from equity. (3) In the Middle Ages, civil law meant Roman law as set forth in the law books of Justinian, in distinction from the ecclesiastical or canon law. In England, at the same period, civil law meant Roman law as distinguished from English law. (4) Because the part of the Roman law which has most influenced European legal development is that part which deals with the ordinary relations of private persons, civil law has come, in modern European usage, to mean private law in general, without regard to its origin, as distinguished from public law. (5) In modern English usage, civil law includes and designates all the existing systems of private law that are in the main based on the Roman law. Civil law in this sense is a blend of Roman, Teutonic, ecclesiastical, and purely modern institutions and rules, fitted into a framework which is still substantially Roman. It prevails not only upon the Continent of Europe and in the dependencies of the Continental European States, but also in Scotland and in many parts of the world that were first colonized and civilized by the Portuguese, Spanish, Dutch, or French, and which today are independent (Central American and South American republics), or are under the rule of Great Britain (e.g. South Africa, some of the West-Indian islands, the Province of Quebec) or are now included in, or belong to, the United States (e.g. Louisiana, Porto Rico, and the Philippines). It is also finding its way, in some measure, into non-Christian portions of the world (e.g. Turkey and Japan).

HISTORY OF THE CIVIL LAW.

I. *The Roman City Law* (*jus civile*), during the Royal Period (down to about B.C. 500), was largely religious in its character. The patricians had '*sacral*,' or religious, customs which controlled the public law of the city and regulated their own family relations. The so-called Royal Laws (*leges regiæ*), of which some fragments have been preserved, were obviously priestly formulations of these customs. The plebeians apparently had no share in this religious law, and they certainly had special forms of marriage and of testament. The customs regulating property and debt were the same for both orders, and were secular in their character. The interpretation of all law, however, whether religious or secular, rested with patrician priests; and after the expulsion of the kings the enforcement of the law was in the hands of patrician magistrates. In consequence of plebeian complaints and agitation, the non-political custom of the city was reduced to writing; and the Law of the Twelve Tables, thus drafted, was submitted to and accepted by the popular assembly (c.451-50 B.C.) This code, of which numerous fragments have come down to us, set forth simple rules suitable to an agricultural community, in a remarkably clear and terse fashion. It established equal law for both orders, except in the matter of marriage; and a few years later (c.445 B.C.) even this inequality was removed. This law was prized by the Romans as a charter of liberties, and they were reluctant to amend its provisions by legislation. The necessary development of the law was therefore obtained during the following three centuries by interpretation. For two centuries the priestly order remained the authoritative interpreters; but after B.C. 252, when a plebeian became *pontifex maximus*, the legal system lost its predominantly religious character. With the expansion of Rome, its law was extended over

Latium; but the Roman city law was not applicable to the Italian allies (*socii*), unless expressly made so by treaty. The best reconstruction of the Royal Laws is that of Voigt; of the Twelve Tables, that of Dirksen and Schöll. Both may conveniently be consulted in Bruns, *Fontes Iuris Romani Antiqui, Leges et Negotia* (6th ed., Mommsen and Gradenwitz, editors, Leipzig, 1893).

II. *Roman Mediterranean Law* (*jus gentium*).—The extension of Roman rule over the Mediterranean basin compelled the Romans to work out a new system of law. The Roman city law was not, in theory, applicable to the provincials, since these were not citizens, but subjects; and it would have been ill suited to the needs of Mediterranean commerce. Between the years B.C. 250 and 150, the new law required was developed: (1) in the edict of the pretor of the foreigners (*prætor peregrinorum*), who administered justice in Rome in all controversies except those in which both parties were citizens; and (2) in the edicts of the provincial governors (proconsuls and propretors). In matters of purely local interest (e.g. family relations and inheritance) the provincial edicts apparently preserved local usages; but in matters of commercial interest the provincial edicts were patterned after the edict of the foreign pretor in Rome. A common law of property, of contracts, and of judicial procedure was thus established for the entire Mediterranean basin. The sources of this law, according to the Romans, were the usages of all the ancient peoples (*jus gentium*) and natural reason. During the last century of the Republic, the rules of the new system were gradually made applicable to controversies between Roman citizens. This was accomplished in the edict of the city pretor. In this edict, moreover, the Roman law of inheritance was modified and made more equitable. Of the city edict in its final form, much has been preserved. The best reconstruction is that of Lenel, *Das Edictum Perpetuum* (Leipzig, 1883).

III. *Roman Imperial Law.*—At the close of the Republican Period, Roman citizenship had been extended throughout Italy. Under the Empire it was gradually extended through the provinces, until, early in the third century, Caracalla made all the free inhabitants of the Empire Roman citizens. With this change the city law of Rome became, in theory, the law of the Empire. The pretor of the foreigners and his edict disappeared; but the city edict and the provincial edicts remained in force. These, however, had ceased to develop; the city edict received its final revision in the reign of Hadrian (A.D. 117-138). During the first three centuries of the Empire, the law was developed partly by legislation, proceeding from the Emperor and the senate, partly by juristic interpretation. Legislation gradually effaced provincial diversities; interpretation fused the city law and the pretorian law into a harmonious system. In this period, the leading jurists were drawn more directly than before into the administration of justice. Three of the most famous, Papinian, Paul, and Ulpian, were successively chief justices of the Roman Empire. The juristic literature of the late Republic and early Empire (B.C. 100 to A.D. 250) was very extensive, and of the highest order of excellence. It consisted largely of the collection and criticism of recorded decisions (*responsa*) and the scientific formulation of the principles on which they were based; that is, it was substantially a progressive digesting of case law. Little of this literature has been preserved, except in the Digest of Justinian. Of the works which have survived—which may conveniently be consulted in Huschke, *Jurisprudentiæ Antejustinianeæ quæ supersunt* (5th ed., Leipzig, 1886)—the most important are the *Institutes* of Gaius and fragments of Paul's *Sentences* and Ulpian's *Rules*. (Gaius has been translated by Poste, Oxford, 1871, 3d ed. 1890; Gaius and Ulpian by Abdy and Walker, Cambridge, Eng., 1876, 3d ed. 1885; and by Muirhead, Edinburgh, 1880, 2d ed. 1895.)

IV. *Codification.*—After the middle of the third century, the law was developed solely by Imperial constitutions, viz. decisions (*rescripta*) and enactments (*leges*). The first attempts at codification were systematic arrangements of these constitutions. Such were the *Codex Gregorianus* (about A.D. 295) and a supplementary *Codex Hermogenianus*, published in the following century. These were private compilations. The first official revision of the Imperial laws was made under the direction of the Byzantine Emperor Theodosius II. The *Codex Theodosianus* was published A.D. 438, not only in Constantinople, but also, by arrangement with Valentinian III., in Rome. The greater part of this code has come down to us. The fullest edition is by Hänel, 1842. Some additional fragments have been edited by Krüger (1880). Theodosius had entertained, but did not carry out, a broader plan, involving an official digest of the older law, as set forth in the juristic literature. This plan was taken up by the Byzantine Emperor Justinian, and carried out under the direction of his minister, Tribonian. The law books published by Justinian were: (1) *Institutes* (November 21, A.D. 533). This book, which sets forth the elements of the law, is based on the Institutes of Gaius. It was intended primarily for law students, but it was published with statutory force. (2) *Digest* or *Pandects* (December 16, 533), a full exposition of the older law, civil and pretorian. It is composed of excerpts from the juristic literature of four centuries (c.100 B.C. to c.300 A.D.)—chiefly, however, from the literature produced between A.D. 150 and A.D. 250. The greater part of the excerpts seem to have been reproduced without change; but antiquated terms were replaced by those current in the sixth century, and in some cases the passages quoted were condensed or amplified. Like the literature from which it was compiled, the Digest is substantially a collection of case law. (3) *Codex* (April 7, 529; 'second reading,' December 17, 534)—a revised collection of Imperial constitutions, based on the earlier codes and replacing them. The language of these law books is Latin, although some passages in the Digest and many of the constitutions in the Code are in Greek. During the remaining years of his reign, Justinian issued many new constitutions (*novellæ*), mostly in Greek; but of these no official compilation was made. The combination of the Novels with the other law books of Justinian, under the general title *Corpus Juris Civilis*, dates from the twelfth century. The best edition is that by Mommsen and Krüger. There are complete French and German translations of the *Corpus Juris*, but only the *Institutes* have been translated into English (Moyle's *Institutes*, 2d ed. 1890). For the history of Roman law to Justinian, the best English work is by Muirhead, *Historical Introduction to the Private Law of Rome* (2d ed., Edinburgh, 1899).

V. *Roman and Teutonic Law in the Middle Ages.*—The law books of Justinian remained in force in the Byzantine Empire until the end of the ninth century, when they were condensed into a single Greek code, the *Basilica*. This, in its turn, remained nominally in force until the capture of Constantinople, by the Turks, in 1453; but, in fact, briefer private compilations were more generally used. One of these, the *Hexabiblos*, made in Thessalonica (Salonica) in 1345, had legal authority in Greece as late as the nineteenth century. In the Teutonic kingdoms established on the ruins of the Western Roman Empire, the conquered Romans continued to live (at least in their relations with one another) by the Roman law; and in some cases official compilations of Roman law (antedating those of Justinian) were made for their use. The most important of these was the *Lex Romana Visigothorum*, compiled at Aire, in Gascony, under the authority of Alaric II. and published A.D. 506, and commonly known as the 'Breviary of Alaric' (q.v.). It included Imperial constitutions, a condensation of the *Institutes* of Gaius, and passages from Paul's *Sentences*. Until the eleventh century, it was the principal source from which Roman law was drawn in western Europe. Even earlier, in the reign of Euric (466-84), the Visigoths had begun to reduce their own law to written form, and their example was followed by other Teutonic tribes. So came into existence the *Leges Barbarorum* (as they were termed afterwards), written in Latin, and exhibiting more or less Roman influence. The most important of these are: The *Lex Antiqua* of the Visigoths, the law of the Burgundians (*Lex Gundobada*), and the law of the Salian Franks (*Lex Salica*), all dating from the close of the fifth century; the law of the Ripuarian Franks, dating from the close of the sixth century; and the law of the Longobards, compiled in the seventh century. In Spain Visigothic legislation developed, in the course of the seventh century, into an elaborate code, the *Lex Visigothorum* (later known as the '*Forum Judicum*' or '*Fuero Juzgo*'). It is a blend of Teutonic, Roman, and ecclesiastical law, and it bound Goths and Romans alike. In the eighth century this national development was arrested by the Moorish Conquest of the Iberian Peninsula. In the Frankish Empire (which, in the course of the eighth century, came to include all Christian Europe, except Great Britain and Ireland and the Byzantine Empire) the system of the 'personal statute' prevailed: each German tribe lived by its own law, and the people representing the Roman element in Gaul, Burgundy, and Italy lived by Roman law. Here also, as in Spain, new law (in this case European law) was in process of creation by Imperial legislation (*capitularies*) and the decisions of the Imperial courts; but in the ninth century this development also was arrested by the disruption of the Empire. In the new nations in process of formation, the royal authority was too slight either to enforce the old Frankish laws or to develop new national law. With the gradual disappearance of racial distinctions, the *leges barbarorum* became obsolete, and the 'personal statute' was supplanted by local law, largely customary in character. In southern France and in central and southern Italy, where the Roman element was strongest, the local laws were mainly Roman; in Germany and in northern France, they were mainly Teutonic; in northern Italy and in Spain, Roman and Teutonic rules were more equally blended; but each local system, in the absence of any appellate jurisdiction, developed independently. Across these local differences ran class distinctions; there were separate courts and different laws for the nobles, the peasants, and the townsmen. In most of these courts judgments were rendered by men familiar with the customs of their locality or their class (*scabini, échevins, Schöffen*), but without other legal training. The most important body of written law produced in this period (except the canon law) was a twelfth-century Lombard code of feudal law (*Libri Feudorum*), which obtained great authority throughout Europe. Many city laws, and not a few territorial and local customs, were also put into written form, usually by private persons. Among the more important are the so-called *Etablissements de Saint Louis* (1272 or 1273), the *Grand coutumier de Normandie* (1270-75), and the *Mirror of the Saxons* (*Sachsenspiegel*, about 1230).

VI. *Canon Law.*—Throughout the Middle Ages, there existed still another set of courts—viz. the ecclesiastic courts—applying a law which was not local, but European, and which bound all Christians. From the ordinary judge (*judex ordinarius*), the bishop or his surrogate, appeals ran to Rome, and the interpretation of the canon law was kept uniform by the decisions of the Papal Curia. In the Pope and the General Council the Church possessed also effective legislative organs. Canon law profoundly affected the development of European law in many matters; in particular, it gave Europe a common law of marriage and of family relations and rational forms of judicial procedure. For the development of the ecclesiastical law as a whole, and for its codification, see CANON LAW.

VII. *Reception of the Law Books of Justinian.*—Till the eleventh century, the only texts of Roman law that were most used in Western Europe were the 'Breviary of Alaric' and similar scanty compilations. In the eleventh century, however, the law books of Justinian were studied and used in Lombardy, in southern France, and in Barcelona; and there was a regular law school in which the laws of Justinian were taught at Pavia. Early in the twelfth century a more thorough and minute study of these texts, particularly of the Digest, was inaugurated at Bologna by Irnerius; the canon law was taught with equal thoroughness; and by the close of the century the University of Bologna had 10,000 students, largely foreigners from all parts of Europe. Before the end of the thirteenth century law schools were established in twelve other Italian cities. From Italy the systematic study of the civil and canon laws spread through Europe. In Italy the text of Justinian was 'glossed'—i.e. furnished with a running marginal commentary; and in the thirteenth century one Accursius digested the glosses of his predecessors and produced what came to be recognized as the standard gloss. The revival of the study of the law books of Justinian was followed, in many parts of Europe, by the 'reception' of these books as authoritative law; where, as in Italy and southern France, Roman law of a sort was already in use, the substitution of fuller and better texts was a simple matter, and here the reception came early. In Germany and the Netherlands it came late; it was not completed until the beginning of the sixteenth century. The reception was facilitated, especially in Germany and Italy, by the theory of 'continuous empire,' which viewed the Roman emperors as legal predecessors of the mediæval kings and princes. The reception, further, was in part the result, and in part the cause, of a gradual change in the organization of the courts, judges learned in the civil and canon laws taking the place of the *scabini*, or lay judges. The fundamental cause, however, of the reception of ancient Roman law was the inadequacy of mediæval law. The revival of commerce, in the twelfth and following centuries, and the social changes which ensued, necessitated a more highly developed law. The first result of the revival of commerce was the reception, throughout Europe, of the ancient law merchant, which had survived in the eastern Mediterranean region; but this law was applicable only to traders, and its reception did not solve the problems that were raised by the increasing importance of personal property. Hence the subsequent reception of the entire Roman private law. In those parts of Europe where economic conditions changed more slowly and local customs longer remained adequate—e.g. in Switzerland, in the Scandinavian kingdoms, and in Russia—the law books of Justinian were not received. These countries became civil-law countries later, partly through the influence of the universities, partly by borrowing or imitating French and German legislation. A second and negative cause of the reception was the inability of the mediæval State to work out the new law that was required. In those countries in which central legislative power existed, or in which appeals were running to a supreme court, the law books of Justinian were not received. They were not received in England, nor in northern France, nor in Aragon; and in Castile the Roman law, as taught in the universities, was received only indirectly, in the form of an independent Spanish code—viz. the law of the 'Seven Parts' (*Las Siete Partidas*), prepared under the auspices of Alfonso X. (1252-84). Even in those countries in which the Imperial Roman law was not received in gross, there was, nevertheless, more or less reception in detail; that is, special institutions and rules were borrowed. Where the law books of Justinian were received, they were applied: (1) as modified by the canon law; (2) as interpreted by the Italian commentators; (3) as subsidiary law, not overriding, but only supplementing, local laws. The judges trained in the Roman law were, however, not friendly to local laws. They insisted that such laws must be proved to be in force; and where the local law was unwritten, it was not easy to convince them of its validity.

VIII. *Modern Codification.*—In Spain and in France, the earlier modern codes were collections of provincial and local laws—viz. the laws (*fueros*) of the different Spanish provinces and cities and the revisions of the same, dating from the thirteenth century to the nineteenth; and the customs (*coutumes*) of the French provinces, published under royal authority in the fifteenth and following centuries. In Germany and in Italy the earlier modern codes were State codes—e.g. those of Bavaria (1756), Prussia (1794), Baden (a translation of the Code Napoléon, 1809), and Saxony (1863); and those of the Two Sicilies (1819), Parma (1820), Piedmont-Sardinia (1837), and Modena (1851).

The principal civil codes now in force in Europe are national codes. The oldest of these is the French Civil Code, commonly known as the Code Napoléon, promulgated in 1804. It is still in force in Belgium, and it has served as a model for much subsequent codification, especially in Latin countries. The Austrian Civil Code dates from 1811. The Italian Civil Code was published in 1865; the Spanish Civil Code in 1888-89; both of these are based upon the French Code. The German Civil Code was published in 1896, and has been in force since 1900. All of these codes, except the Spanish, have supplanted the older provincial and State codes; indeed, the chief object with which they were framed was to create common national law. Nearly all of the smaller European States have civil codes. In Switzerland, where cantonal codes are still in force, there is already a federal code of obligations, and a general civil code is in preparation.

In America, French law has been codified in Lower Canada (now the Province of Quebec; Code of 1865) and in Louisiana (Code of 1808, amended 1824, and since from time to time revised). In nearly all the Spanish-American States, the civil law has been codified, with the Code Napoléon as the chief model. The more important of these codes are those of Bolivia (1831), Peru (1851), Chile (1855), Uruguay (1868), Argentina (1869), Mexico (1870, revised 1884), Colombia (1873, revised 1887). Identical with the Chilean Code, or based upon it, are the codes of Nicaragua (1867), Guatemala (1882), Salvador, Honduras, Venezuela (1880), Costa Rica (1884), Ecuador (1890). The Argentine Code was adopted by Paraguay in 1889. The Spanish Civil Code of 1889 is in force in Cuba, Porto Rico, and the Philippines. To this list of civil-law codes should be added the new Civil Code of Japan (1898), since its provisions, except as regards the family, are largely drawn from modern European codes. A general history of European law is yet to be written, although there are good histories of the law of Germany, Italy, France, Spain, etc. Consult Savigny, *Geschichte des römischen Rechts im Mittelalter* (2d ed. Heidelberg, 1834-51), which is still the most important general work. There are special works on the reception of Roman law by Schmidt (Göttingen, 1868) and Modderman (Groningen, 1874).

CIVIL LIST. An annual allowance granted to the sovereign and the members of the royal family in constitutional monarchies, where the Parliament has obtained control of the purse. In England down to 1660, the entire expenses of government, civil and military, were defrayed out of what was called the 'Royal Revenue.' This revenue, which arose partly from Crown lands and partly from other sources, remained for a long period after the Conquest at the disposal of the Crown; and even after supplies were voted by Parliament, the specific mode of their expenditure continued to be free from Parliamentary control. After the accession of William III., a distinction was drawn between the military and naval expenditure, which was henceforth voted by Parliament annually, and the civil list proper, which included the maintenance of the royal household, the salaries of the judges, ambassadors, and such great officers of State, and such miscellaneous disbursements as the secret-service money and pensions. The Civil List was fixed at £600,000. Under William IV., all salaries were transferred from the Civil List to the National Budget, and the royal grant placed at £510,000. Upon the accession of Victoria, the hereditary revenues of the Crown were consolidated with the national domains, in lieu of which the sovereign was allowed an annual stipend of £385,000, to be devoted solely to the support of the royal household and the honor and dignity of the Crown. The British monarch also enjoys the income from the Duchy of Lancaster, varying from £50,000 to £60,000 annually. The charges on the Civil List for the benefit of the royal family amount to £168,000. In all the countries of Continental Europe, with the exception of Russia and Turkey, the sovereign and the members of the royal family are provided for by a civil list, generally in proportion to the value of the royal possessions which they may have ceded to the nation. The income of European monarchs ranges from $300,000 in the case of the King of Denmark to $4,000,000, which represents the allowance made the King of Prussia.

CIVIL PROCEDURE. Legal procedure—the process whereby legal rights are protected and enforced, and violations of private or public rights punished. As commonly employed in English and American law, however, the term 'civil' refers to private as distinguished from public rights, and civil procedure would not include the processes of the tribunals in protecting the peace and vindicating the dignity of the State, i.e. criminal procedure. Neither does it cover any administrative process of the State, nor diplomatic or other action for the purpose of protecting the interests of citizens or subjects in foreign lands. See PROCEDURE; INTERNATIONAL LAW.

CIVIL RIGHTS. See RIGHTS, CIVIL.

CIVIL RIGHTS BILL. In American history, a bill passed by Congress in 1866, as one of the Reconstruction measures of that body, for the purpose of securing an equality of civil rights to all citizens of the United States, and particularly for the purpose of placing the freedmen in the South on an equal political footing with the whites. Its main provision was as follows: "All persons born in the United States and not subject to any foreign power, excluding Indians not taxed, are hereby declared to be citizens of the United States; and such citizens of every race and color, without regard to any previous condition of slavery or involuntary servitude, except as a punishment for crime whereof the party shall have been duly convicted, shall have the same right, in every State and Territory of the United States, to make and enforce contracts, to sue, be parties, and give evidence, to inherit, purchase, lease, sell, hold, and convey real and personal property, and to the full and equal benefit of all laws and proceedings for the security of person and property, as is enjoyed by white citizens, and shall be subject to like punishment, pains, and penalties, and to none other, any law, statute, ordinance, regulation, or custom to the contrary notwithstanding." The other sections of the bill merely provided for the carrying out of this provision and fixed penalties for its infraction. The bill passed the Senate on February 2 by a vote of 33 to 12, and the House on March 13 by a vote of 111 to 38; was vetoed by President Johnson on March 27, and was passed over the veto by the Senate on April 6, and by the House on April 9. It was the subject of an animated debate both in and out of Congress, and the challenging of its constitutionality led to the passage and adoption of the Fourteenth Amendment. Another bill, of March 1, 1875, provided further for the rights of the blacks, prescribing that blacks should not be distinguished from whites by inn-keepers, teachers or officers of schools, theatre-managers, and common carriers; that Federal courts should have exclusive jurisdiction over infractions of the bill; and that negroes should not be excluded from juries. See RECONSTRUCTION.

CIVIL SERVICE. The civil service of a State is, properly speaking, the entire body of public officials charged with the duty of conducting its civil administration. As commonly employed, however, the term does not include members of the military and naval establishments, nor members of the legislative branch of the Government; nor, generally, other elective officers. Indeed, in the popular connotation of the phrase, the direct representatives of the sovereignty, whether elective or appointive, are not usually included. Thus, neither the appointed members of the British Cabinet nor the elected President of the United States would usually be described as civil servants; while there is no doubt that the Viceroy of India and the Civil Governor of the Philippine Islands, as well as the members of the President's Cabinet, come under that designation. On the other hand, it is not usual to include within the description of the civil service mere laborers, though the method of their employment, their terms of office, and, sometimes, the nature of their duties, render it difficult to distinguish them from their co-employés of the State, who are undeniably within the common acceptation of the term.

The civil service of a modern civilized State is a very complex affair, consisting of a multitude of officers and civil servants of various grades, performing a great variety of highly differentiated functions, and grouped in various administrative departments. Some of the more important of these are modern additions to the functions of the State, while others are of great antiquity. Thus, the officers of the royal household in England, many of the officers of the courts of justice in Great Britain and the United States, can trace their offices back to the very beginnings of English history, while such great administrative departments as the Post-Office, the British Board of Trade, the United States Department of Agriculture and Interstate Commerce Commission are of recent origin. It is to the modern additions, especially to the institution of a postal service, that we owe the enormous increase in the number of public servants in the latter half of the nineteenth century. To this should be added, however, as contributing causes, the large increase in the number and size of cities in recent times, with the growing necessity for police protection, together with the assumption, by municipalities and by the State, of a variety of services and functions that were previously left to private enterprise; such as the cleaning of streets, the removal of waste, and the furnishing of a water-supply in cities, and, in some countries, the building and management of telegraph-lines, railways, and canals, and of irrigation-works on a large scale, by the general Government.

The British civil service now numbers about 80,000 officials of all grades. At the head stand the officers of the Royal Household, under several departments; then come the officers of the House of Lords and the House of Commons; then a vast number of offices or departments, of which the following are the more important: Treasury, home office, foreign office, colonial office, India office, war office, admiralty, board of trade, post-office, customs, inland revenue (including stamps, taxes, and excise), exchequer and audit office, office of woods and forests, office of works and buildings, Duchy of Lancaster, public-record office, local government board, education department, civil-service commission, registrar-general's office, stationery office, ecclesiastical commission, charity commission, patent-office, emigration office, Trinity House, herald's college, law and equity courts, ecclesiastical and admiralty courts, prisons department, British Museum, science and art department, diplomatic and consular corps. Several departments peculiar to Scotland and Ireland form distinct lists, not included in the above. The heads of most of the departments are political officers, changing with the Ministry. Others, such as the head of the exchequer and audit department, or the commissioners of customs and of inland revenue, are permanent officials. Excluding the judicial offices, and a few departments where special knowledge is required, the civil service is open to the public generally, the principle of open competition being in force as regards most of the departments. See GREAT BRITAIN, paragraph on *Government.*

The civil administration of the Federal Government of the United States is confided to a body of upward of 100,000 officials. These are all included within the eight general departments of the National Government—the Departments of State, Justice, Interior, War, Navy, Treasury, Post-Office, and Agriculture — and Congress, though some of these contain a large number and variety of bureaus dealing with a great diversity of interests not logically related to the main business of the department. As examples of this incongruity, it is only necessary to mention the National Observatory, under the jurisdiction of the Navy Department, and the National Library, under that of Congress. The President is the great source of power in the American Federal system, all the officers of the Government, excepting the Vice-President, the members of the two Houses of Congress, and the employés of the latter, owing their offices to his appointment.

The curious identity of the governmental and administrative forms which have been adopted in the several States of the American Union is treated in the article UNITED STATES, section on *State Government.* The result of this identity is, of course, a great similarity in the civil service of the States. In most of the States, the principal judicial officers and the heads of the great departments of administration, as well as the Governor and Lieutenant-Governor, are chosen by popular vote. Generally, each elective officer has the power to name his own subordinates, the Governor's appointing power being limited to his own clerks and secretaries and to the officials of certain bureaus or commissions, which do not come under the jurisdiction of the constitutional departments of administration. The restricted character of the functions of the States in our Federal system has thus far furnished no occasion for an extensive civil service, and, accordingly, the number of persons employed in that service in the State governments is very small compared with the number employed in the Federal service. The establishment of a State constabulary, or police system, or the assumption by the Commonwealth of the ownership and operation of telegraphs, railroads, or other great industrial enterprises, would of course enormously increase the civil service of the State.

In the modern city, on the other hand, by reason of the great diversity and extent of the functions of municipal government in our day, the number of civil servants is very great, and tends constantly to increase. Not only the purely governmental operations of a city government, as the maintenance of a police force and efficient local tribunals; not only its quasi-governmental functions, as the regulation and administration of a system of public instruction, the cleaning of streets, and the removal of waste: not only its gigantic business enterprises, as in supplying its citizens with water and gas, and the building and operation of bridges, systems of transportation, etc.; but also its administration of the property interests committed to its charge, as the docks, parks, streets, etc., call for a vast and complicated machinery of administration and an army of civil servants. American cities have generally reproduced, with great fidelity and uniformity, the type of municipal government brought over by our earliest city-builders from England. The head of the administration is a mayor, elected by popular vote, and with him are usually chosen a treasurer, comptroller, or other financial officer, and sometimes other heads of departments. But generally the power of appointment vested in the mayor is a large one, and often it extends to the appointment of most if not all of the chiefs of the several administrative departments of the local government. See CITY; MUNICIPAL GOVERNMENT.

Local political divisions, such as counties, towns, parishes, and school districts, present a greater diversity of governmental form and administration; but in the United States the number of appointive officers in those divisions is small, and in a general view of the subject of civil service they do not call for special consideration.

The method of appointment to the public service and the tenure of the civil servant vary greatly in England, according to the historical character of the service; in the United States, according to the jurisdiction and the rank of the official. High officers of State are appointed in Great Britain by royal warrant: in the United States, by commission. In the former country the complexity of the service is great, many public officers deriving their status from long usage, and being attended with privileges and immunities of immemorial force. Many of them are for life, many have the personal quality associated with the feudal tenure of land, and some are hereditary. Indeed, by the common law of England, public office was a species of real property, held by a tenure, like land, and vesting in the incumbent an estate, either for life or in fee. Even as late as the middle of the eighteenth century, offices are enumerated by Blackstone in his classification of real property as one of the class of incorporeal hereditaments. (See Office.) To-day, however, most of the positions in the public service in England and all offices in the United States are, in law, regarded as held in trust for the public benefit; and though an appointment to office usually vests in the incumbent a certain definite right to perform its duties and enjoy its emoluments, it no longer entitles him to make merchandise of it, to alienate it, or to transmit it to his heirs. All public offices in the United States being of comparatively recent origin, and created by statute, there is much greater simplicity and uniformity in the mode of their creation and in the incidents of their tenure than in Great Britain. Comparatively few positions in the public service here are held by a life-tenure—the principal exceptions being high judicial positions in the Federal service and in a few of the States. In many cases an office is held at the will of the appointing power, and by statute a large proportion of the positions in the Federal service are held by a four years' tenure. See Tenure-of-Office Act.

The power of appointment to the public service, even when, as is usually the case, unrestricted in theory, may be practically limited by custom, by the despotism of political party control, or, as in the case of the President of the United States, by the operation of self-imposed rules. The British Parliament, and many of the United States, have enacted laws restricting the exercise of the power of appointments, and prescribing the qualifications for the civil service, and providing for an impartial method of selection among the candidates for office: and in several States these provisions have been embodied in the Constitution. The object of these laws being to raise the moral tone and improve the efficiency of the civil service by eliminating, so far as possible, political motives for appointments, and by securing to the incumbents of public office independence of external control, whether personal or political, some form of the so-called 'merit system' (q.v.) has generally been adopted. Similar boards exist in New York and in many other cities to govern appointments to municipal office. This system will be fully described under that title; but it may be noticed, here, that it is based on the principle of competitive examinations, conducted by a board of administrative officers known usually as 'Civil-Service Commissioners.' The results of the examinations and the rating of the candidates are reported by the Civil-Service Board to the appointing officer, who makes his selection from among the names so certified to him, as the law may direct.

The power of appointment being vested in the President of the United States by the Federal Constitution, it is not within the power of Congress to fetter his action by the enactment of similar laws. The merit system has, however, been extensively applied by the voluntary action of the President, most of the great departments of the Government being now wholly or in large part under its operation—the most conspicuous exceptions being the post-offices, the consular service, and the Census Bureau.

In many of the States, by law, and in some departments of the Federal Administration by executive order, the independence of civil servants has been further secured by provisions restricting the power of removal from office, in many cases by providing for a definite tenure, and in others by requiring the removing officer to file his reasons for making the proposed removal, and to give the accused official an opportunity to be heard in his own defense. In still other cases, where the tenure is for life, or 'during good behavior,' the action of the removing officer may be reviewed by the courts, and the removed official reinstated if the grounds for the removal are deemed by the court to be insufficient. Generally, however, where the tenure is not permanent, the provisions above described operate solely as a check on hasty and inconsiderate action, and as securing to the civil servant reasonable notice and the consideration of his claims upon the office, and vest no power of review in the courts. It has been judicially determined that the civil-service rules promulgated by the President of the United States do not have the force of general law, and confer upon members of the service no right to invoke the aid of the courts to protect them against violation thereof. They are the President's law, and he alone can enforce them. The general effect of the adoption of the merit system and of the legislation last referred to has been most salutary. The evils at which these laws were aimed, and the history of the popular movement which resulted in their general adoption, will be found set forth in the article on Civil-Service Reform. See Ashley, *The American Federal State* (New York, 1902); Anson, *Law and Custom of the Constitution* (Oxford, 1892); Eaton, *Civil Service in Great Britain* (New York, 1880); Goodnow, *Comparative Administrative Law* (New York, 1893); and the authorities referred to under Civil-Service Reform.

CIVIL-SERVICE REFORM. In the most general sense, the adoption, by legislation or executive action, of rules for improving the civil service of the State by prescribing the qualifications of candidates for public office, and for the good behavior of public servants and their independence of external control. Specifically, and as commonly employed in the United States, the expression refers to the movement of the last hundred years in Great Britain and the United States for the elimination from the public administration of the corrupting influences of party politics.

Owing to the power which has usually attended the possession of public office and the lack of any effective supervision or criticism, public administration has in all stages of political development been affected with corruption and inefficiency and extravagance. The various forms of autocratic government, which preceded the more popular governments of our day, furnished a peculiarly favorable soil for the growth of these evils. (See Civil Administration.) It was a disappointing result of the first effective appearance of government 'by the people' in modern times, that it should not only have failed to correct these tendencies of the earlier régime, but should have intensified them and given them new and more enduring vitality. It is to the excessive and vicious development of the party system in its earlier stages that we owe this condition of affairs. Human nature is much the same under all forms of government; and it is, therefore, not to be wondered at that great party leaders, like Bolingbroke and Walpole, having great patronage at their command, should employ it to consolidate their power or that of their party. The 'spoils system,' as it is called in the United States, had its inception with the real beginning of popular government, in the reign of William III. William III. was himself a great administrator, and his first efforts were directed to a reform in the public service. But the only permanent 'reform' effected was the substitution of Parliament for the Crown as the source of office and official corruption. At the accession of Anne in 1702, the party system had enveloped the whole civil service of Great Britain. All of the offices of State and all employments under them, from the highest to the meanest, were the assets of the party in power and were available for party purposes. The results of the system were in the highest degree demoralizing to the public administration and to the public spirit of the nation. As has been well said of this period in England, "the partisan system of appointments and promotions aggravated the evils of Parliamentary patronage, made administration costly and feeble, spread corruption from the departments to cities, boroughs, and elections, while it disgusted the better class of citizens, alarmed statesmen, and exasperated and debased all political contests." Matters grew steadily worse through the early part of George III.'s long reign, the efforts of Rockingham, Burke, Pitt, and other patriots to stay the tide of corrupt practices being neutralized by the stubborn resistance of the King. The tide turned, however, with the coming in of the second Rockingham Ministry in 1782, and when George IV. ascended the throne, in 1820, though the partisan system still existed, its worst abuses had been driven out by the growth of a better public sentiment. The great Reform movement which culminated in 1832 had no direct concern with administration and produced no immediate effect on the movement for administrative reform; but the 'merit system' of selecting candidates for office was tried on a small scale as early as 1834, and slowly but steadily made its way. It was probably the demoralization of the Indian service which opened the eyes of British statesmen to the necessity for more sweeping methods of reform; and after securing the passage of the India Act of 1853, the Government of Lord Aberdeen appointed a commission, consisting of Sir Stafford Northcote and Sir Charles Trevelyan, to make an inquiry into the condition of the public service and to suggest improvements therein. This commission having in the same year reported, recommending a uniform system of competitive examinations to test personal fitness for the public service, in 1855 such a system was established by the Ministry of Lord Palmerston, through an order of the Queen in Council. This sweeping reform, which has proved to be as permanent as it has been salutary, was brought about by the wisdom and experience of the administration, in the face of a hostile majority in Parliament and an apathetic public opinion. The beneficial effects of the new system quickly became apparent, and in the extremely short space of four years had roused a strong public sentiment in its favor and won the unanimous support of Parliament, and in 1859 was fully legalized by statute. The last step in the reform of the British civil service was taken in 1870, when the competition, previously somewhat restricted, was thrown open by an Order in Council to all persons of requisite age, health, and character.

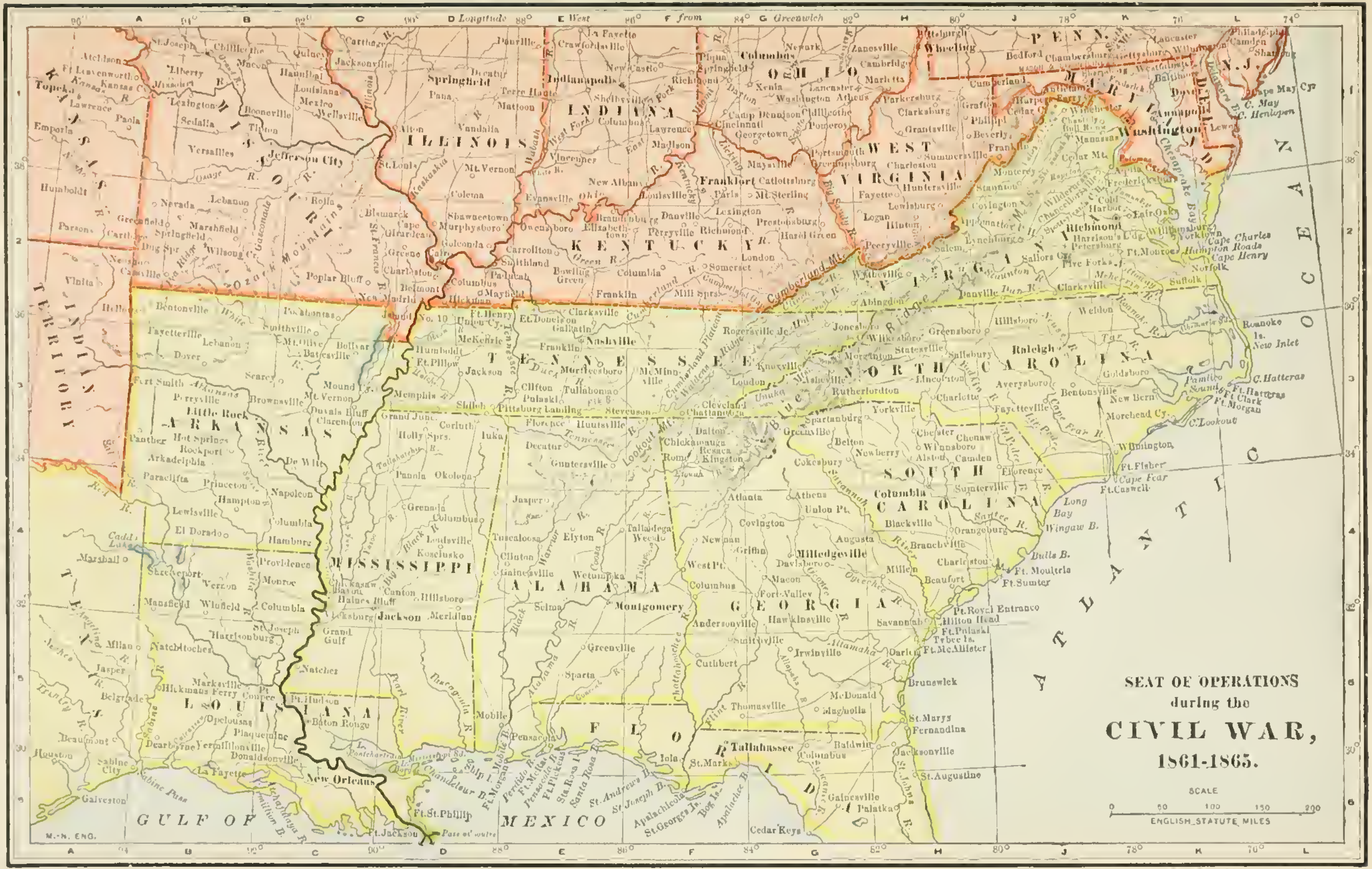
The 'spoils system' and its reform have had a shorter and a more recent history in the United States. It was instituted by President Jackson in 1829, as an incident of his bitter and proscriptive campaign for the Presidency, at a time when it was already on the wane in Great Britain. The doctrine enunciated in the notorious declaration of Senator Marcy, that "to the victor belong the spoils of the enemy," rapidly became the accepted principle of political action in this country, and represents a more thoroughgoing and vicious form of the system than ever existed in England. There, as here, office was the reward of party service; but the principle of the 'clean sweep,' whereby an incoming administration makes room for its supporters by the wholesale removal of the incumbents of the public service, was the exclusive possession of the American Republic. So well adapted did this principle prove itself to the American party system, that it spread rapidly from the national Government to the several States until it permeated the entire public life of the country. So firmly did it become intrenched in the civic life of the American people, that it has been affectionately described and defended by its supporters as the 'American system.' Its essentially artificial character is evidenced by the fact that in the forty years from the beginning of Washington's administration to that of Jackson, not a single subordinate officer of the Government was removed without cause, while in Jackson's first term the number of such removals rose to thousands.

This was not accomplished without protest, however. The new principle was vigorously combated in the Senate of the United States by Clay, Webster, Calhoun, and other leaders—the first of whom denounced it as "a detestable system, drawn from the worst periods of the Roman Republic." But nothing availed to stay the tide, and for forty years more no President raised his voice against the system or failed to act upon it. But the sentiment in favor of reform was slowly gathering force, and in 1867 it found its first effective expression in a report to the House of Representatives, made by Mr. Thomas A. Jenckes of Rhode Island, recommending the establishment of a merit system, based upon competitive examinations. A second report, recommending similar action, was made by Mr. Jenckes the next year, but it was not until 1871 that the growing force of public opinion compelled Congress to take action upon the subject. In that year a clause in the general appropriation bill authorized the President to prescribe rules for admission to the civil service, and to appoint a commission for that purpose. President Grant thereupon appointed the first Civil Service Commission, with George William Curtis as chairman, and in December of the same year the Commission reported, recommending a set of rules and regulations. This report was adopted and the rules and regulations of the Commission put into effect, and thus the first victory for Civil-Service Reform was won. These rules, with certain additions to them recommended by the Commission in the spring of 1872, remained in force until the winter of 1875, when the growing opposition of the politicians induced Congress to withhold the annual appropriation for the working of the system, and the President yielded to party pressure and suspended the operation of the Civil-Service Rules.

The most memorable event in the long struggle for the reform of the civil service in the United States was the organization of the Civil-Service Reform Association in New York in May, 1877. This organization, and the National Civil-Service Reform League into which it developed, under the presidency of Mr. Curtis, instituted an active propaganda for the creation of a public sentiment in favor of the reform, and by its meetings and public addresses, and by the high and disinterested character of the men who were prominent in its work, powerfully stimulated the movement. After this the triumph of the reform was not long delayed. In January, 1883, the bill introduced by Senator Pendleton, of Ohio, which, in the language of the National Civil-Service Reform League, provided "a constitutional, practical, and effective measure for the remedy of the abuse known as the spoils system," was adopted by overwhelming majorities of both Houses of Congress, and the 'merit system' was an established fact. The Civil-Service Law, which went into effect in July, 1883, prohibited the vicious practice of levying assessments for partisan purposes upon members of the civil service of the Government, authorized the appointment of a commission to frame rules and regulations for the civil service, and empowered the President, from time to time, to determine by executive order what classes of the public services should come under the operation of such rules. In the same year a similar bill, applying the same principles to the civil service of the State of New York, was passed by the Legislature and became a law, and in the following year the system was extended by statute to the twenty-three incorporated cities of that State. In 1884, also, the new system was adopted in Massachusetts. The reform of the civil service was now secure, but still far from complete. The President (Arthur), who had himself, as a New York politician, been a devoted adherent of the old system, nevertheless administered the new one faithfully; but it was deemed expedient to proceed slowly in its application, and only 14,000 employés of the Government were at first brought within the 'classified service.' It must be said that the high tide of public feeling which resulted in these sweeping victories for the movement has never been reached again, and that the active hostility of party leaders has greatly retarded its progress. The new system has made gains; it has been adopted in whole or in part in a few more States, and it has been extended by executive order of the President to classes of public servants not previously affected by it, but in many of the United States the political 'machine' has been strong enough to maintain the old system unimpaired, and in many others there is a complete absence of popular feeling on the subject. In other words, the political development of the American people has not yet reached the point, attained by the English electorate a generation ago, of recognizing the supreme importance of clean and efficient administration to the welfare of the State. Much of the progress of the past twenty years has been due to the cautious initiative of enlightened Presidents, especially of Cleveland, Harrison, and Roosevelt, the last of whom has long been known as a devoted friend of the reform movement, and, as Civil-Service Commissioner under President Harrison, did much to commend the new system to the American people. The nature of the 'merit system' and its operation will be described under that title. The character of the partisan system will be found discussed in the article on the 'Spoils System.' See also CIVIL SERVICE; and consult: Eaton, *Civil Service in Great Britain: A History of Abuses and Reforms and Their Bearing Upon American Politics* (New York, 1880); George William Curtis, *Orations and Addresses*, vol. ii. (New York, 1894); Theodore Roosevelt, *American Ideals*, part ii. (New York, 1900); Bain, *Practical Essays* (London); Clarke, *Civil-Service Law* (3d ed., New York, 1897); Rogers, "George William Curtis and Civil-Service Reform," in *Atlantic Monthly* (January, 1893); and the reports of the American Civil-Service Reform Association.

CIVIL WAR IN AMERICA. The conflict between the Northern and Southern States of the Union, in 1861-65; ostensibly and immediately occasioned by disagreement between the two sections on the subject of the control of slavery, but perhaps not less the result of long-standing differences in political and economic theories. The public agitation of the Abolitionists; the nomination of anti-slavery candidates for the Presidency, at each election, from 1840; the introduction in Congress of the 'Wilmot Proviso' (q.v.), in 1846; the passage of the Fugitive Slave Law, in 1850, and the incidents connected with its enforcement; the repeal of the Missouri Compromise in 1854; the 'Dred Scott' case (q.v.) in the United States Supreme Court, in 1857; the adoption of the Lecompton Constitution for Kansas, in 1858; the John Brown raid at Harper's Ferry, in 1859—served to force slavery into conspicuous notice as the leading political issue to accentuate the irreconcilable divergence of beliefs relative thereto, and to intensify the bitterness which rendered a peaceful settlement of the problem still more difficult. The projection into politics of a sectional issue served to divide the only party that still retained a following both North and South—the Democratic—and to bring about the nomination of four Presidential candidates in 1860: Stephen A. Douglas, of Illinois, and John C. Breckenridge, of Kentucky, who were nominated by the two wings of the Democratic Party; John Bell, of Tennessee, who was nominated by the so-called Constitutional Union Party; and Abraham Lincoln, of Illinois, who was nominated by the Republican Party. Abraham Lincoln was elected President, exclusively by the votes of the North; and the immediate effect of his election was to precipitate the secessionist movement. A State convention met at Charleston, December 17, and on the 20th passed an ordinance declaring that "the union now existing between South Carolina and other States, under the name of the United States of America, is hereby dissolved." This example was followed by acts, similarly phrased, passed by conventions of ten other Southern States, in the following order: Mississippi, January 9, 1861; Florida, January 10; Alabama, January 11; Georgia, January 19; Louisiana, January 26; Texas, February 1; Virginia, April 17; Arkansas, May 6; North Carolina, May 20; Tennessee, June 8. The States of Missouri, Maryland, and Kentucky were divided in sentiment on the question of secession, and in the ensuing war had representatives in the governments and armies of both sections. The western counties of Virginia remained loyal to the Union, and separated themselves from the rest of the State. On February 4, 1861, a Congress met at Montgomery, Ala., in which were represented all the States that had passed ordinances of secession previous to that date. This Congress adopted for the new organization a Provisional Federal Constitution, which was later ratified, and the title 'Confederate States of America.' Jefferson Davis, of Mississippi, was elected President, and Alexander H. Stephens, of Georgia, Vice-President, of the new Confederacy. In the meantime the State forces of South Carolina had seized the United States Custom-House, Post-office, and Arsenal in Charleston, and had taken possession of Forts Pinckney and Moultrie in the harbor of that city; Major Robert Anderson, in command of Fort Moultrie, with a force of only 128 men, many of whom were non-combatants, having withdrawn to Fort Sumter, which he considered more defensible. On April 12, 1861, hostilities began with the bombardment of Fort Sumter, which, after a brave defense, although several times set on fire by shells, was surrendered on the 14th by Major Anderson—the small garrison withdrawing with the honors of war. There were no casualties on either side. On the day following this event, President Lincoln issued a proclamation calling for 75,000 volunteers for three months; this was followed by a proclamation declaring the blockade of the Southern ports; and, on May 3, a second call was issued for 64,000 men for the army and 18,000 for the navy, to serve 'during the war.' The United States Regular Army consisted, January 1, 1861, of 16,402 officers and men; but these had been dispersed by John B. Floyd, Secretary of War under Buchanan, to distant parts of the country. Under his directions, also, quantities of arms and ammunition had been transferred from Northern to Southern arsenals, during 1860; and the ships of the United States Navy were mostly absent at foreign stations by direction of the Secretary of the Navy, Toucey. A very large proportion of the Southern army officers resigned and entered the Confederate service, though this course was by no means so general on the part of Southern officers in the navy. In the Southern States, preparations for war were carried on with great energy. Gen. Robert E. Lee was appointed commander-in-chief of the Confederate forces in Virginia, their main body being concentrated at Manassas Junction. On June 10 a Union force was repulsed by the Confederates at Big Bethel, Va. (q.v.), and on July 21 was fought the first battle of Bull Run (q.v.), when the Confederates, under Generals Johnston and Beauregard, completely defeated the Federals, under General McDowell, and threatened the capital. This was the first important battle of the war, and its effect was to rouse both sides to what now promised to be a long and bloody struggle. Meanwhile, General McClellan (q.v.) had succeeded in wresting the western portion of Virginia from the Confederates; and immediately after the disastrous defeat at Bull Run, he was appointed commander-in-chief of the Army of the Potomac. His skill in organizing and disciplining large bodies of men, and making valuable soldiers out of raw and inexperienced recruits, doubtless qualified that army for the magnificent part it afterwards took in the war.

The Congress of the United States met in extra session July 4, 1861, and, in response to the President's call, voted 500,000 men and $500,000,000. The Northern States, in their individual capacity, had before this time drawn upon their own resources in behalf of the Union cause—New York and Pennsylvania each voting $3,000,000 for the prosecution of the war; Massachusetts and other New England States sending regiments into the field fully armed and equipped; while in every city, town, and village volunteers were gathering and forming themselves into companies and regiments, to be afterwards offered to the Governors of the respective States, and through these officials to the country. The latter half of the year 1861 was devoted mainly to organization, and the engagements that occurred were generally without great importance. At the South the enlistment of 400,000 men was going on under a call from the Confederate Congress. The Confederates also had possession of the United States Arsenal at Harper's Ferry and of the Navy-Yard at Norfolk, Va., where they had seized 2000 cannon and the steam-frigate *Merrimac*, one of the finest in the United States Navy. General Lyon succeeded in securing Missouri for the Union by a series of successful engagements, terminating in the battle of Wilson's Creek (near Springfield), August 10, in which he fell. On October 21 the Confederates gained a success by almost annihilating the Federal force of 1500 to 1700 men which had been sent to Ball's Bluff (q.v.) on the Potomac, and left there unsupported. Gen. U. S. Grant, after having seized Paducah, at the mouth of the Tennessee River, and another important strategic point at the mouth of the Cumberland, captured, on November 7, the Confederate camp at Belmont, Mo., though he was soon driven back by the Confederate General Pillow, acting under orders from General Polk. On the same date a United States naval force under Admiral Dupont captured Forts Walker and Beauregard at Port Royal, S. C. On the following day the Confederate commissioners, Mason and Slidell, were taken, by Captain Wilkes of the United States frigate *San Jacinto*, from the British mail steamer *Trent*, while on their way to their respective missions to England and France. Complications with England were averted by the prompt disavowal of Captain Wilkes's act by the United States Government. The Federal force in the field in the beginning of 1862 was about 450,000 men; the Confederate force about 350,000. During January some successes were gained in Kentucky, at Prestonburg and Mill Springs, by the Federals, under Colonel Garfield and General Thomas. General Grant, aided by a naval force under Commodore Foote, cap-



SEAT OF OPERATIONS
during the
CIVIL WAR,
1861-1865.

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tured Fort Henry, on the Tennessee River, February 6; and ten days later General Grant attacked Fort Donelson, on the Cumberland, which surrendered with nearly 15,000 prisoners and 40 cannon. A naval expedition under General Burnside and Commodore Goldsborough captured Roanoke Island. New Berne, N. C., on February 8. On March 7-8 occurred the battle of Pea Ridge, in western Arkansas, in which the Federals under Gen. S. R. Curtis defeated the Confederates under Gen. Earl Van Dorn. On March 9 the Confederate ironclad *Virginia* (formerly the *Merrimac*), after having on the preceding day inflicted great loss on the wooden vessels of the Union squadron in Hampton Roads, was herself defeated in a remarkable naval engagement by the newly constructed *Monitor*, under Worden. In the West the Northern campaign was directed toward opening the Mississippi, and toward cutting the Memphis-Charleston railroad line. In the course of the southward movement for the latter purpose, General Grant fought the great two days' battle of Shiloh (or of Pittsburg Landing), on the Tennessee River, April 6-7. On the first day the attack of the Confederates, under Generals A. S. Johnston (who fell) and Beauregard, threatened the destruction of the Union force, but on the second day Grant, reinforced by Buell, drove the enemy from the field. In this theatre of the war, at the close of the following month, the Federals, under Halleck, compelled the evacuation by Beauregard of the important strategic point of Corinth, Miss. On April 8 General Pope and Commodore Foote captured Island No. 10 (q.v.), in the Mississippi River. Fort Pulaski, near Savannah, Ga., was bombarded and captured by Major Gillmore. April 11; and at the close of this month New Orleans was captured by Farragut and occupied by Northern forces. The Army of the Potomac, which had devoted its time during the winter of 1861-62 to organization, moved early in the spring to the peninsula formed by the James and York rivers, and gained an equivocal success at Williamsburgh. Va., May 5. The army then advanced up the peninsula to the Chickahominy, and won the battle of Fair Oaks (Seven Pines), on May 31-June 1, against Gen. Joseph E. Johnston, but the approach of 'Stonewall' Jackson, with a force fresh from a victorious advance through the Shenandoah Valley, to coöperate with Lee, made it necessary, in the judgment of McClellan, to effect a change of base to the James River; and this hazardous movement was accomplished at the expense of some of the hardest-fought engagements of the war, known collectively as the Seven Days' Battles—those of Oak Grove, June 25; Mechanicsville, June 26; Gaines's Mill, June 27; Savage's Station, June 29; Frazier's Farm, June 30; and Malvern Hill, July 1. In July Halleck was appointed commander-in-chief of the Union armies, but he did not assume personal command. As a result of the peninsula movement and the 'change of base,' the advantage remained with the Confederates, who had successfully defeated the original plan for the capture of Richmond by this route. The scene of the Eastern campaign was thus again shifted to northern Virginia, and on August 29-30 occurred the second battle of Bull Run (q.v.), between the Federal forces commanded by Gen. John Pope and the Confederates under Lee, Jackson, and Longstreet. Pope was utterly defeated, and his broken and dispirited columns were driven back upon Washington. Lee now undertook the invasion of the Union territory, and crossed the Potomac into Maryland. McClellan encountered him successfully at South Mountain, September 14, and definitively checked his progress in the severe battle of Antietam, September 16-17, forcing him to retreat across the Potomac. Harper's Ferry, which had been evacuated by the Confederates in June, 1861, was recaptured by Stonewall Jackson (q.v.), September 15, 1862, when 11,583 men and a great quantity of munitions of war fell into the hands of the Confederates. On September 22 President Lincoln issued a proclamation decreeing the emancipation on January 1, 1863, of all slaves in the States which should till then continue in a state of rebellion. This was followed on January 1 by a proclamation definitively emancipating the slaves in the rebellious States. On November 7, 1862. General McClellan was superseded in the command of the Army of the Potomac by General Burnside, against the wish of the latter, who was defeated disastrously at Fredericksburg, Va., December 13. (See FREDERICKSBURG.) On January 26, 1863, General Burnside was relieved by General Hooker, who was defeated by Lee in a great battle at Chancellorsville (q.v.), on May 2-4. The death of Stonewall Jackson made the victory a dearly bought one for the Confederates. Lee followed up this success by invading Maryland again, and early in June entered Pennsylvania. On June 28 Hooker was relieved from the command of the Army of the Potomac by Gen. George G. Meade (q.v.), and the latter at once pursued the Confederates with such celerity and determination that Lee was forced to stop and give battle. The two armies met in the great battle of Gettysburg, which lasted July 1-3. General Reynolds was killed during the first day's fight, and on the last day General Hancock was dangerously wounded. The result of the three days' battle was a most complete Federal victory. Lee, having recrossed the Potomac, now retreated to a position on the Rapidan, and strategic movements on the part of the two armies, accompanied by occasional heavy skirmishing, occupied the time until winter. In the Southwest, since the close of 1862, the main operations had centred about Vicksburg, converted by the Confederates into a great stronghold. After various attempts at its capture had failed, General Grant, by a series of brilliant strategic movements, succeeded in May, 1863, in closely investing the city, and on July 4, almost at the moment of the victory of Gettysburg, General Pemberton was forced by famine to surrender the place with his army of 30,000 men. The fall of Port Hudson, July 8, secured the complete control of the Mississippi by the Union forces, and thus separated the two sections of the Confederacy. The struggle for the middle ground of Kentucky and Tennessee was marked by the battles of Perryville, October 8, 1862, and of Murfreesboro, December 31, 1862, and January 2, 1863, with a result favorable to the Federals. On September 9, 1863, General Rosecrans occupied Chattanooga. On September 19-20 he fought a bloody battle at Chickamauga and was defeated, the heroic stand made by General Thomas alone saving the Union army from destruction. This reverse was more than redeemed by the great victory of Grant over Bragg at Chattanooga (November 23-25—storming of Lookout Mountain, November 24, and of Missionary Ridge, November 25). This made it possible for Sherman to raise the siege of Knoxville, where General Burnside had been hard pressed by the Confederates under Longstreet. At the close of the year the Federal forces held Missouri, Arkansas, Kentucky, Tennessee, a large part of Louisiana, Mississippi, and Florida, and the Rio Grande frontier of Texas, and had control of the Mississippi River. A draft in the Northern States for 300,000 men, with an exemption clause, had added 50,000 men to the Federal armies.

In the early part of 1864 General Banks, assisted by Gen. A. J. Smith and a fleet under Admiral Porter, undertook an expedition up the Red River. A defeat at the hands of Generals Kirby Smith and Richard Taylor at Sabine Cross Roads, April 8, ruined the prospects of the expedition, which ended in complete failure.

General Grant was made Lieutenant-General and Commander-in-Chief in March, 1864. He turned over his command in the West and South to Sherman, and took personal command of the armies of the East. A combined movement against the two remaining armies of the Confederates, those of Lee and Johnston, was now to be made under the personal direction of these two great generals. Sherman's army was in motion from Chattanooga by May 7, and forced General Johnston through Georgia as far as Atlanta, defeating the Confederates at almost every point in a series of vigorous engagements, including those at Dalton, Rome, and Resaca, though he met with a severe defeat at Kenesaw Mountain. General Hood, who now replaced General Johnston, made repeated but disastrous attacks upon Sherman's forces (July 20, 22, 28), and after being beleaguered in Atlanta, evacuated the city, which was occupied by Sherman on September 2. In the meantime the Army of the Potomac, with General Meade in immediate command, had broken camp on the Rapidan, and undertaken the tremendous campaign of the 'Wilderness,' with the design of forcing the fighting straight to Richmond. During this campaign of forty-three days, fully 130,000 men on the Federal side and about 70,000 men on the Confederate side, with constant reinforcements, were engaged almost continuously. On May 5-6 was fought the battle of the Wilderness, which was followed by the battles of Spottsylvania Court-House, the sharp engagement on the North Anna, and the terrible repulse of the Federal army at Cold Harbor on June 3. Finally, on the night of June 12, the Army of the Potomac crossed the Chickahominy, and took position on the south side of the James River. The design of this movement was to threaten Richmond by way of Petersburg; and, to thwart it, Lee at once threw a large portion of his army within the defenses of the latter city, which proved to be impregnable to assault, and only to be reduced by regular approaches and a skillful siege. The regular investment of Petersburg was begun on June 19. While this protracted siege was in progress, the Confederate General Early made a rapid movement across the Potomac, achieving a success on the Monocacy July 9, and threatening Washington itself. He then withdrew into the Shenandoah Valley, and engaged in a vigorous campaign against General Sheridan, which ended, after a defeat near Winchester on September 19, in General Early's utter rout at Cedar Creek October 19. On June 19 the *Kearsarge* ended the destructive career of the Confederate cruiser *Alabama*, by sinking her off Cherbourg, France. In the month of August Admiral Farragut forced his way into Mobile Bay and defeated the Confederate squadron. General Sherman set out from Atlanta on his famous 'March to the Sea' on November 15, carrying his compact army of 60,000 men through the heart of Georgia, and occupied Savannah on December 21, after carrying Fort McAllister by assault on the 13th. While Sherman was thus successful, General Hood had invaded Tennessee, driving the Federal forces before him. His movement ended in the battle of Nashville, December 15-16, where his army was destroyed by General Thomas. Thus at the close of the year the Federal forces were in possession of a large portion of the South, and Sherman was in a position to have the coöperation of the navy, and thus to move northward securely, so that he and Grant might hold between their two armies the weakened forces of both Lee and Johnston. In 1864 Abraham Lincoln was renominated by the Republicans, and General McClellan was nominated by the Democrats, who put forth a platform declaring the war a failure. Twenty-five States took part in this election; the electoral vote was 233, of which Lincoln received 212; the popular vote of Lincoln and Andrew Johnson, of Tennessee, was 2,223,035, and that of McClellan and Pendleton 1,811,714. During the latter part of December and January General Sherman had remained in Savannah, resting his troops; but on February 1, 1865, he again took the field. Marching through South Carolina, he took possession of Columbia on February 17, and on the following day Charleston, which had been besieged since 1863, was occupied by the Federals. Sherman now pushed on into North Carolina, where, on January 15, Fort Fisher, near Wilmington, had been captured, and where now two other Federal armies—under Schofield from New Berne, and Terry from Wilmington—coöperated with him, the three armies meeting at Goldsboro, N. C. Gen. J. E. Johnston, with the main army of the Confederates in that region, made an ineffectual attempt to check Sherman's advance at Bentonville, N. C. On March 24 General Grant issued an order for a combined movement of the armies operating against Richmond, to take place on the 29th. But on the 25th General Lee made a desperate attempt to break through the Federal line on the Appomattox River, and Fort Stedman was captured by the Confederates, only to be immediately retaken. On March 31-April 1 General Sheridan defeated the Confederates at Five Forks, which protected the South-Side Railroad, and thereby Lee's connections with Richmond, and captured 6000 prisoners. This was the final and irretrievable blow to the Confederate Army. On the following day, April 2, General Grant attacked along the whole line in front of Petersburg, and on the evening of that day both Petersburg and Richmond were abandoned. General Lee retreated toward Lynchburg, but was intercepted by Sheridan, and on April 9 surrendered his army to General Grant at Appomattox Court-House. General Johnston finally surrendered his army on April 26, although he had practically surrendered eight days earlier. On May 4 General Taylor surrendered the Confederate forces in Alabama to

General Canby. The last fight of the war took place May 13, 1865, on the Rio Grande. The last Confederate army in the field—the Trans-Mississippi—was surrendered by Kirby Smith, on May 26. At the moment of final victory occurred the assassination of President Lincoln, on April 14.

The number of Federal soldiers in the field during the war was 2,666,999, the number drafted and held to service being 43,347; furnished substitutes, 73,607; paid commutation, 86,724; total drafted, 206,678, to which should be added 87,588 credited to the States under the draft of 1862; making in all drafted, 294,266. The amount of commutation moneys received by the Government was $26,366,316.78; the amount of bounties paid by the United States Government was $300,223,500; by State and local authorities, $285,941,036. The casualties in the Federal Army numbered 359,528; 110,070 men were killed in action or died of wounds; and 249,458 men died from disease, accident, or other causes. The entire available force capable of active service in the field, enrolled in the Confederate armies, was about 500,000 men. Their entire loss in killed and wounded during the war was about 95,000 men; that from disease, accident, and other causes is unknown. During the war Confederate cruisers, fitted out mostly in British ports, scoured the ocean, doing irreparable damage to the commerce of the United States. (See Alabama Claims.) After the evacuation of Richmond, Jefferson Davis, President of the Confederacy, fled south, and was captured May 10, 1865, at Irwinville, Ga., by General Wilson's forces, as he was attempting to make his escape farther south. In company with certain others of the prominent leaders of the Confederacy, he was imprisoned for a time, but was not eventually punished. See Nullification; Reconstruction; United States; Lincoln; Grant.

Bibliography. Two brief general works are: *A Short History of the War of Secession*, by Johnson (Boston, 1889), and T. A. Dodge, *Bird's-Eye View of Our Civil War* (Boston, 1883). A more detailed work is the *History of the American Civil War*, by Draper (3 vols., New York, 1867-70). An important though unfinished military history is that by J. C. Ropes, *Story of the Civil War* (2 vols., New York, 1899). A series of valuable monographs on various campaigns of the war is Scribner's *Campaigns of the Civil War* (New York, 1881); and a noteworthy collection of essays, largely by participants in the events described, is *The Battles and Leaders of the Civil War*, edited by Johnson and Buel (4 vols., New York, 1887). The original material bearing on the war has been published by the United States War Department, in an extensive series, begun in 1880 and completed in 1901, entitled *War of the Rebellion: Compilation of Official Records of the Union and Confederate Armies* (Washington). Numerous volumes of military memoirs have been written by officers of the two armies; and some of them, notably Grant's *Memoirs*, are of great value. There is also a *History of the Civil War*, by the Comte de Paris (4 vols., Philadelphia, 1875-88). For particular phases of the conflict, consult: J. Bigelow, *France and the Confederate Navy* (New York, 1888); J. D. Bulloch, *Secret Service of the Confederate States* (London, 1883); and J. Fiske, *The Mississippi Valley in the Civil War* (Boston, 1900). With reference more particularly to the political aspects of the war, consult: Jefferson Davis, *Rise and Fall of the Confederate Government* (2 vols., New York, 1881); Giddings, *History of the Rebellion* (New York, 1864); Greeley, *The American Conflict* (2 vols., Hartford, 1864-66); Logan, *The Great Conspiracy* (New York, 1886); Pollard, *The Lost Cause* (New York, 1868); and vol. i. of Blaine, *Twenty Years in Congress* (2 vols., Norwich, 1884-93). See, also: Moore, *Rebellion Record* (11 vols., New York, 1861-71); and McPherson, *Political History of the Great Rebellion* (Washington, 1864). Recent works of value are; *The Civil War and the Constitution*, by Burgess (2 vols., New York, 1901); vol. vi. of Schouler, *History of the United States Under the Constitution* (New York, 1899); and Rhodes, *History of the United States from the Compromise of 1850* (4 vols., New York, 1893-1899).

CIVIL WARS IN FRANCE. A play by Dekker and Drayton, produced in 1598.

CIVIL-WAR VETERANS, Societies of. Associations of veterans of the United States Civil War or their descendants. The predominant purpose of these associations is social; occasionally, however, political aims have been added, as in the case of the Grand Army of the Republic, which has striven successfully for the increase of the pension list and rate, and has become recognized as a considerable factor in national politics. The oldest of the Civil War associations is the Military Order of the Loyal Legion. (See Loyal Legion.) Membership in this society is restricted to officers of the army, navy, and marine corps, and to their oldest male lineal descendants; thus following closely, in organization, the Society of the Cincinnati. The most influential as well as the largest of the societies of the Civil War is the Grand Army of the Republic (q.v.). This organization admits to membership any soldier or sailor of the army, navy, or marine corps who was honorably discharged. It has two auxiliary organizations, known as the 'Woman's Relief Corps,' which admits to membership mothers, wives, daughters, and sisters of Union soldiers, and the Sons of Veterans, which is composed of lineal descendants of those who served in the Civil War. Similar to the Grand Army is the Union Veteran Union (see Veteran Union, Union), the membership clause of which, however, is more exacting, requiring service for a term of three years. This society also has an auxiliary society, known as the Ladies of the Union Veteran Union, and the Loyal Guard, for its junior male members. The Union Veteran Legion (see Veteran Legion, Union) admits to membership only participants in some battle who possess an honorable discharge from the army. In addition to the foregoing, there are three special organizations, whose character is indicated by their names. They are: The Society of the Army of the Tennessee, organized on April 14, 1865; the Society of the Army of the Cumberland, organized February 6, 1868; and the Society of the Army of the Potomac, organized September 2, 1868. There was formerly a Society of the Army of the James, but that was merged, in 1876, into the Society of the Army of the Potomac. There are also numerous corps societies, such as that of the Eleventh Army Corps and the Sixth Army Corps, which hold annual meetings, and whose work has consisted largely in the erection of monuments on various battle-fields and in other places to the memory of their leaders. The National Association of Naval Veterans (q.v.) admits to membership any appointed or enlisted man who served in the navy during the period of the Civil War. The memory of the Civil War is preserved in the Southern States through the instrumentality of three flourishing organizations, known as the United Confederate Veterans (see CONFEDERATE VETERANS, UNITED), which admits to membership actual participants in the Civil War; the United Sons of Confederate Veterans (see CONFEDERATE VETERANS, UNITED SONS OF), which was organized by the male descendants of the Confederates; and the United Daughters of the Confederacy (see CONFEDERACY, UNITED DAUGHTERS OF THE), which admits to membership the widows, wives, mothers, sisters, and lineal female descendants of those who served in the Confederate armies. There are various other societies which, while they do not restrict their membership to participants in the Civil War, admit to membership participators in that conflict or their descendants. Of this character are the Military Order of Foreign Wars (see FOREIGN WARS, MILITARY ORDER OF), the Naval Order of the United States (q.v.), and the Medal of Honor Legion (q.v.).

CI′VIS (Lat., citizen). A *nom de plume* employed by Sir Henry Russell, in letters on Indian affairs in the London *Times*, between 1842 and 1849.

CIVITÀ CASTELLANA, chē′vê-tä′ käs′tĕl-lä′nȧ (It., castle city). A city in central Italy, about 27 miles north by west of Rome, in the province of that name (Map: Italy, G 5). It is picturesquely situated on an elevation above the Rio Maggiore, which unites with the Treja not far below the town, and flows into the Tiber five miles farther down. The town is near the site of the ancient Etruscan city of Falerii. The surrounding ravines contain many Etruscan tombs and the remains of an Etruscan temple. There are also interesting ruins of a Roman theatre, and the twelfth-century Abbey of Santa Maria. The Neapolitans, led by Mack, were here defeated by the French under MacDonald, December 4, 1798. Population (commune), in 1881, 4406; in 1901, 5265.

CIVITALI, chē′vê-tä′lê, MATTEO (1435-1501). An Italian sculptor, born at Lucca. He apparently trained himself by study of the early Florentines, in particular of Desiderio da Settignano (q.v.). His manner is not unlike that of the paintings of the time, and the reverential touch which marks his principal work has caused him to be regarded as among the foremost Renaissance sculptors. The chief examples of his art are to be found in the Cathedral of San Martino at Lucca. They include a richly decorated pulpit (1498); the altar of Saint Regulus, with figures of Saint John the Baptist and Saint Sebastian, and fine reliefs (1484); two angels, represented as in adoration, in the Chapel of the Sacrament; and, notably, the monument to Pietro da Noceto, the secretary of Pope Nicholas V. (1472). There is also a monument to Saint Romanus by him in the Church of San Romano at Lucca. Six statues by him in the Chapel of Saint John at Genoa are less characteristic. Consult the study by Yriarte (Paris, 1886).

CIVITAVECCHIA, chē′vê-tä-vĕk′kê-ȧ (It., old city). A fortified seaport in the Province of Rome, central Italy, situated on the Tyrrhenian Sea, 37 miles northwest of Rome (Map: Italy, F 5). It is the chief port of Rome, and its harbor is protected by two curving moles and a breakwater with a lighthouse. There are extensive dry-docks, a magazine, an arsenal built by Bernini, and a citadel constructed from plans by Michelangelo. The fortifications date from the sixteenth and seventeenth centuries. The city has an aqueduct 18 miles long. Civitavecchia is of considerable commercial importance, and has regular steam communication with England and France. It is the seat of a bishop and of a number of foreign consuls, including one from the United States. In the vicinity of the town are situated sulphur-springs, with remains of ancient baths. Civitavecchia is the ancient Centum Cellæ, sometimes called Portus Trajani in honor of Trajan. It was destroyed by the Saracens in 828, but its exiled inhabitants returned in 854, when it received the name of Civitavecchia (old city). It was fortified by Urban VIII., and declared a free port by Innocent XII. in 1696. The French held it from 1849 to 1870. Population, in 1881 (commune), 11,980; in 1901, 17,589.

CIVOLI, chē′vō-lê, LUDOVICO. See CIGOLI, LUDOVICO CARDIDA.

CLAAR, klär, EMIL (1842—). A German stage-manager and author. He was born at Lemberg, and made his first appearance as an actor at the Burgtheater, Vienna. After holding engagements at Gratz, Brünn, Innsbruck, and at the Court Theatre, Berlin, he successively became stage-manager of the Stadttheater, Leipzig (1864-70), and of the Court Theatre, Weimar (1870-71), and was subsequently appointed director of the Landestheater, Prague, and the Residenztheater, Berlin (1876-79). From 1879 to 1900 he was associated as director with the two principal theatres of Frankfort-on-the-Main, but afterwards he confined himself solely to the management of the Schauspielhaus, in that city. Among lyrical poems and dramas written by him are the following: *Gedichte* (1868 and 1885); *Neue Gedichte* (1894); *Weltliche Legenden* (1898); *Samson und Delila*, a comedy (1872); *Shelley*, a tragedy (1876); *Die Schwestern*, a drama (1892).

CLACKMAN′NAN (Gael. *Clachan Mannan*). The county-town of Clackmannanshire, Scotland, on the Devon, nine miles east of Stirling (Map: Scotland, E 3). The neighborhood is rich in coal, iron, and limestone. On a hill above the town is the ruined tower of a castle once belonging to the Bruces. Population, in 1901, 2494.

CLACKMANNANSHIRE. The smallest county of Scotland, in the East Midland Division, at the head of the Firth of Forth, and bounded by the counties of Perth, Fife, and Stirling (Map: Scotland, E 3). Area, 48 square miles. It is an agricultural and coal-mining county; oats, barley, wheat, and potatoes are the chief crops. The leading towns are Clackmannan, the county-town, Alloa, and Dollar. Population, in 1801, 10,900; in 1851, 23,000; in 1901, 32,000.

CLADODUS. See CLADOSELACHE.

CLADOSELACHE, klăd′ŏ-sĕl′*a*-kē (Neo-Lat., from Gk. *κλάδος*, *klados*, branch + *σέλαχος*, *selachos*, shark). The most primitive genus of shark-like elasmobranch fishes, found fossil in the concretions of the Lower Carboniferous shales of Ohio and elsewhere. The fish had an elongated, round, tapering body, with a short, blunt head, and eyes situated far in front. The fins, of which there are a pair each of pectoral and pelvic, and two low dorsal, are triangular, with broad bases and without spines, the middle rays of the fins being the longest. The heterocercal tail-fin is peculiar in its strongly upturned notochordal axis, with the neural arches continued to the top of the upper lobe; its vertical straight posterior margin and long lower lobe is supported by cartilaginous rays, so that it nearly equals in size the upper lobe. The best-known species are Cladoselache fyleri, with a length of 22 inches, and Cladoselache kepleri, which attained a length of six feet. Both of these are from the Cleveland shale of Ohio. Many of the tricuspid teeth from the Upper Devonian and Carboniferous rocks of Europe and America, described under the generic name of Cladodus, seem to be teeth of Cladoselache. Consult Dean, "Contributions to the Morphology of Cladoselache (Cladodus)," in *Journal of Morphology*, vol. ix., No. 1 (Boston, 1894). See also ELASMOBRANCHII; SELACHII; SHARK.

CLADRAS′TIS (Neo-Lat., from *κλάδος*, *klados*, branch + *θραυστός*, *thraustos*, brittle) (*Cladrastis tinctoria* or *lutea*). A small leguminous tree, resembling the common locust, having a yellow bark, with cathartic properties. It is variously called yellow wood, yellow ash, yellow locust, and fustic. The tree is native of Kentucky, Tennessee, North Carolina, and adjoining regions, growing in rich soils. It is also common in cultivation.

CLAES, kläz, BALTHAZAR. The monomaniac and chemist in Balzac's *La recherche de l'absolu*, whose search for the primal element causes the domestic ruin therein described.

CLAF′LIN, HORACE BRIGHAM (1811-85). An American merchant, born in Milford, Mass. He established himself in business in Worcester, Mass., where, within a few years, he built up one of the largest mercantile establishments in New England. In 1843 he removed to New York, where he established the firm of Bulkley & Claflin, a business which was conducted after the retirement of William Bulkley, in 1851, under the name of Claflin, Mellin & Company. Although the business interests of Mr. Claflin were seriously endangered by his strong anti-slavery attitude, he steadfastly adhered to his opinions, which he did not hesitate to express in public meetings. Upon the outbreak of the Civil War, the house was seriously affected, because of its large business in the South. In consequence of Mr. Claflin's integrity and business ability, however, the volume of trade greatly increased during the war, and reached the enormous sum of more than $72,000,000 in 1865. From this time until his death the transactions of the firm probably exceeded those of any other mercantile house in America. As a man Mr. Claflin was noted for his liberality and his numerous charities.

CLAFLIN, WILLIAM (1818—). An American merchant and politician, born in Milford, Mass. He was in the State House of Representatives from 1849 to 1852, was State Senator in 1860-61, and was president of the Senate in 1861. He became a member of the Republican Executive Committee in 1864, and was its chairman from 1868 until 1872. He was also Lieutenant-Governor of his State (1866-69), and Governor (1869-71). He was elected to the Fortieth Congress as a Republican.

CLAIBORNE, klā′bōrn, or **CLAYBORNE,** WILLIAM (c. 1589-c.1676). An American colonist, prominent in the early history of Virginia and Maryland. He was born in Westmoreland, England; went to Virginia as surveyor in 1621, and in 1625 was appointed by Charles I. Secretary of State for that Colony. He founded a trading-post on Kent Island in 1631, which became a flourishing community, and was represented in the General Assembly of Virginia. Afterwards the island was included in the grant to George Calvert, first Lord Baltimore. Claiborne resorted to arms to maintain his claim, and in 1645 made a descent upon the island, from which, however, he was soon driven. Its possession remained a subject of animated controversy between Maryland and Virginia until 1776. After the execution of Charles I., when Virginia and Maryland had decided in favor of Charles II., Claiborne, in a spirit of revenge, secured an appointment on the commission chosen by Cromwell to reduce them to submission (1651). This was soon accomplished; Governor William Berkeley, of Virginia, was removed from office, and Claiborne became Secretary of State of Virginia, under the new Governor, Richard Bennett. In Maryland all Catholics were promptly removed from office—an act which caused considerable friction until 1658, when the province was restored to Lord Baltimore. After the Restoration, in 1660, Claiborne naturally ceased to have influence at Court, and about 1676 he died in obscurity.

CLAIBORNE, WILLIAM CHARLES COBE (1775-1817). An American politician, first Governor of the State of Louisiana. He was born in Sussex County, Va., studied law in Richmond, Va., removed to Tennessee, and in 1796 was a member of the convention which drafted the State Constitution. Though technically ineligible on account of his age, he was elected to succeed Andrew Jackson as a member of Congress in 1797 and served until 1801. In 1802 he was appointed to succeed Winthrop Sargent as Governor of Mississippi Territory. Together with Gen. James Wilkinson, he was delegated to accept the transfer of Louisiana to the United States in 1803, and in 1804 became first Governor-General of the Territory of Orleans—that part of the Louisiana Purchase lying south of Mississippi Territory and of the thirty-third parallel. His administration of office made him extremely unpopular with the French and Spanish element; but upon the admission of Louisiana, in 1812, he was elected the first Governor of the State, which position he held until 1816. At New Orleans, during the War of 1812, he coöperated with Jackson in repelling the attack of the British. In 1816 he was elected to the United States Senate, but did not live long enough to take his seat.

CLAIBORNE STAGE (from *Claiborne*, in Alabama). A subdivision of the Eocene Tertiary in American geology. The rocks of this stage are found along the Alabama and Tombigbee rivers, in Alabama and in Arkansas. See Tertiary System.

CLAIM (OF. *claim*, demand, from Lat. *clamare*, to call out). A demand of a right; sometimes used of the legal right asserted, as a creditor's claim to be paid the amount due him, sometimes of the amount alleged to be due. In both these senses the term is commonly employed in bankruptcy and other creditors' proceedings against an insolvent debtor, and in the administration of the estates of deceased persons. In all such cases the claim must be proved—i.e. verified by oath—in order to share in the distribution of the assets; the duty of the trustee in the former case, and of the executor or administrator in the latter, being limited to the payment of duly authenticated claims against the estate.

At the common law, a claim was a formal assertion of title to, or of interest in, property, real or personal, which was in the possession of another. It was not a mere protest against an unlawful seisin or detainer of property, but was a recognized process for preserving the rights of the claimant against extinction by reason of lapse of time or other cause. It had, therefore, much of the effect of an actual entry upon land, and was available to one who, by reason of his interest being a future and not a present one (as a remainder or reversion), was not entitled to make an immediate entry; or, as Coke explains, "when a person dares not make an entry on land for fear of being beaten or other injury, he may approach as near as he can to the land and claim the same, and that shall be sufficient to vest the seisin in him." In other cases, however, in which the claimant's right depended on possession, it seems to have been considered that, to make a claim to an estate effective, there must be an actual entry into some part of the lands claimed.

Continual claim was the process whereby one who had been disseised of lands prevented his claim from lapsing by reason of the death of his disseisor, and the transmission of the lands to the latter's heir by descent. In order to avoid this consequence, it was necessary to make claim within a year and a day of the disseisor's death, and, to insure this, to repeat the formality *continually* within that interval until the descent took place. See Adverse Possession; Disseisin.

In the United States the term 'claim' has acquired a distinctive sense as applied to the initial or *prima-facie* title acquired by settlers to Government lands, and by prospectors to mineral lands, under United States statutes. The term is also applied to the land so secured. These claims may, upon the performance of the terms of sale, ripen into complete and valid titles; but, in the meantime, they confer on the claimant or holder a recognized though defeasible property right, which may be bought and sold and administered upon, like any other property. Because of its precarious nature, it is generally considered personal rather than real property. See Government Lands; Preëmption.

In admiralty proceedings the statement of rights of the defendant or other party to property attached under process of the court is called the 'claim.'

Statement of claim is the pleading in which the plaintiff sets forth the facts constituting his cause of action. It supersedes the declaration in England, and corresponds to the complaint in the code practice of most of the United States. The facts are alleged in it in a plain, concise, and natural way, avoiding the arbitrary forms that characterized the declaration in common-law pleading. The phrase is used in some jurisdictions to designate any narrative of facts that is made the basis of a judicial or official proceeding. See Declaration; Pleading.

Claim of liberty, in English law, is a petition to the sovereign, filed in the Court of Exchequer, claiming a privilege or immunity, as freedom from jury duty, by virtue of custom or the petitioner's rank. The claim was made under an actual or supposed grant, as these 'liberties or franchises' (q.v.) were said to have originally been a part of the Crown's prerogative, which could only be enjoyed by a subject by virtue of a grant from the sovereign.

CLAIMS, Court of. In the United States, a tribunal created by act of Congress, or by the legislatures of the several States, to entertain and adjudicate claims against the General Government or against the States so authorizing them. A State, being sovereign, can of course not be sued, or subjected to legal process. It is perfectly obvious that, under ordinary circumstances, the tribunals that are instituted by the sovereign power for the adjudication of controversies and the punishment of offenses against itself cannot be employed, either by a citizen or by another sovereignty, to enforce claims against such power. Indeed, in the legal sense of the term, there can be no such thing as a 'claim' against a sovereign State. In recent times, however, it has become customary for governments voluntarily to submit alleged claims of a civil nature—such, i.e., as involve a demand for a money compensation—to tribunals of limited powers for consideration and determination. Where the controversies are international, the tribunal may be a board or commission of arbitration. Where the claim is that of an individual citizen, the State may either authorize the ordinary tribunals to hear and determine the question at issue, or may create separate tribunals for that purpose. The latter method is the one that has been generally adopted in the United States, both by the Federal Government and the several States. The tribunal so created is variously termed a 'court of claims' or a 'board of claims.' It must be borne in mind, however, that the State does not abdicate its sovereign authority to these courts, and that no process lies for enforcing their decrees. The judgments of a court of claims are in the nature of recommendations only, certifying that the adjudicated claim is, or is not, under the rules established by the statute, a valid and proper claim. If the judgment is in favor of the claimant and against the State, the payment thereof is, like the payment of an award made in an international arbitration, a voluntary act. Under the American system, such payment calls for an appropriation by Congress or the Legislature of the State affected by the decision.

The Court of Claims of the United States (which has served as a model for those of the several States) was created by act of Congress, February 24, 1855, and consisted originally of three judges appointed by the President and Senate, to hold office during good behavior, and to have jurisdiction to hear and determine all claims founded on any act of Congress, or on any regulation of any executive department, or on any contract, express or implied, with the Government of the United States; and all claims which might be referred to it by either House of Congress. The Government was to be represented before it by a solicitor and assistant solicitor appointed by the President; and the compensation of all members of the court was fixed by law. By the act of March 3, 1863, two additional judges were to be appointed by the President, and a Chief Justice from the whole number of judges (five). By this act the court was also authorized to take jurisdiction of all set-offs, counter-claims, claims for damages, liquidated or unliquidated, or other demands whatsoever on the part of the Government against any person making claim against the Government in said court. If the judgment of the court be in favor of the Government, it shall be filed in the office of the clerk of the proper district or circuit court of the United States, and shall *ipso facto* become and be a judgment of such district or circuit court, and shall be enforced the same as other judgments. If the judgment be in favor of the claimant, it is provided that the sum thereby found due to the claimant shall be paid out of any general appropriation made by law for the payment of private claims, on presentation to the Secretary of the Treasury of a duly certified copy of such judgment. In cases where the amount in controversy exceeds $3000, an appeal may be taken to the Supreme Court of the United States at any time within ninety days after judgment. Where the judgment or decree may affect a constitutional question, or furnish a precedent affecting a class of cases, the United States may take an appeal without regard to the amount in controversy. Claims must be filed within six years after the claim accrues, except in cases of disability. The court is required to hold one session annually, commencing on the first Monday in October.

The jurisdiction of the court is not to extend to any claim growing out of any treaty with foreign nations or Indian tribes, unless such claim was pending in said court December 1, 1862; nor shall the jurisdiction of the court extend to any claim against the United States for the destruction, appropriation, or damage of any property by the army or navy engaged in the suppression of the Civil War, from the commencement to the close thereof. The general principle characterizing all the legislation relating to this court is that its jurisdiction is confined to claims arising out of contract or for damages in cases not founding in tort. Accordingly, the Supreme Court of the United States has held that a person injured by the tort—that is, by the wrongful act—of a Government officer or agent, cannot obtain redress in the Court of Claims, but must apply to Congress for relief. It has also been held, by the same court, that in order to obtain a recovery upon an implied contract, the claimant must show that the United States received a consideration for the claim presented, or that they received money or property with a duty to turn it over to the claimant, or that the claimant had a lawful right to it when the United States received and appropriated it. The statutes provided that claims of the character above described may be recovered whether or not they are such as would be prosecuted in a court of law, of equity, or of admiralty if the United States were suable; but the actions in this court are not actions at common law, and therefore the claimant has no right to a jury trial; nor does this court possess the jurisdiction and powers of an equity tribunal. The court has declared that it has never felt itself bound by the strict rules of common law or of equity pleading and practice, but that its aim is to administer justice between the claimant and the Government in a simple and expeditious manner. Proceedings originate in the court by petition filed; and testimony used in the hearing and determination of claims is taken by commissioners who are appointed for the purpose by the court. Consult, for full information, the United States statutes and the digests. For the organization and jurisdiction of similar tribunals constituted by them, the statutes of the several States must be consulted.

CLAIRAC, klâ'răk'. A town in the Department of Lot-et-Garonne, France, situated on the Lot, 16 miles northwest of Agen. It has a trade in white wines. Clairac is interesting as the first place in the south of France which, in 1527, embraced the doctrines of the Reformation, on the example of its abbot, Gerard Rouselle. It was the scene of frequent contests between Roman Catholics and Huguenots. Population, in 1891, 3562; in 1901, 2880.

CLAIRAUT, klâ'rō', Alexis Claude (1713-65). A prominent French mathematician, physicist, and astronomer, born in Paris. He showed a precocity analogous to that of Pascal. At the age of ten he read l'Hôpital's works on infinitesimal analysis and conic sections; before he was thirteen he presented a memoir on curves to the French Academy of Sciences; at sixteen he published his first work, on curves of double curvature, and at eighteen he was elected a member of the Academy. In 1736 he was appointed to accompany Maupertuis on an expedition to Lapland, for the purpose of measuring a degree of the meridian—a work which proved, contrary to the opinion of Cassini, the flattening of the earth toward the poles. Shortly after his return, in 1743, appeared his *Théorie de la figure de la terre*, based on Newton's law of gravitation, and on Maclaurin's results concerning homogeneous ellipsoids. In the field of mathematics Clairaut studied curves of the third order, tortuous curves and projections, and was the first to find the *singular* solution of a differential equation of the first degree in x and y. The equation used by Clairaut, often called Clairaut's form, is $y = px + f(p)$, in which $p = \frac{dy}{dx}$. In physics he first showed the necessity of considering the attraction between the parts of the fluid itself, in order to explain the phenomenon of capillary action; computed the change in gravity at high latitudes, and so fully demonstrated the figure of the earth that little essentially new has since been added. At least, according to Todhunter, "The splendid analysis which Laplace supplied, adorned but did not really alter the theory which started from the creative hands of Clairaut." In the field of astronomy he solved the famous problem of three bodies in the case of the sun, earth, and moon; explained the motion of the lunar apsides, and constructed lunar tables, later supplanted by those of Mayer. Clairaut also predicted the return of Halley's comet for about April 15, 1759; although the degree of accuracy was remarkable for the time, and the approximation closer than Halley's, it failed by a month, and subjected its author to the ridicule of his rival, D'Alembert. During his last years fondness for society and desire for luxury hindered his scientific work. His leading works (published in Paris) are: *Recherches sur les courbes à double courbure* (1731); *Traité de la figure de la terre* (1743 and 1808); *Théorie de la lune* (1752 and 1765); *Eléments de géométrie* (1741 and 1765): *Eléments d'algèbre* (1746 and 1760); and *Théorie du mouvement des comètes* (1760).

CLAIRIN, klȧ'răN', Victor George (1843—). A French painter, who was born in Paris. He was a pupil of Picot and Pils, and afterwards traveled in Spain and Morocco with Henri Regnault. Many of his works are Spanish historical scenes, and in this manner "Après la victoire" (1885) is notable. His portraits include those of Mounet-Sully as Hamlet (1889), Sarah Bernhardt, and Madame Krauss. He also executed a number of decorative paintings in the Opera-House, the Bourse, and in the Salle-des-jeux at Monte Carlo. His work is fine in color, and his decorative subjects effective, and executed with much freedom.

CLAIRON, klȧ'rôN', Mlle. (1723-1803). A French actress, whose real name was Claire Josèphe Hippolyte Legris de Latude. She was born near Condé, in Flanders, and had played for several years at Rouen, Lille, and elsewhere before she appeared at the Paris Opéra, and a little later, in September, 1743, made her first appearance at the Théâtre Français. This was in *Phèdre*. Her success was immediate and brilliant, and she became the rival of Mlle. Dumesnil, then at the height of her popularity. Mlle. Clairon was of small stature, but with a beauty which was both vivacious and dignified, and she was gifted with a remarkable voice. She and her colleague Lekain were known as innovators, for endeavoring to bring about a more rational mode of costuming than was at that time conventional upon the stage. Some of her greatest achievements were in the *Zelmire* and *Le siège de Calais* of Belloy, and in the tragedies of Voltaire, *Zulime*, *Sémiramis*, *Olympie*, *Tancrède*, *Oreste*, and *L'Orphelin de la Chine*.

In 1765, as the result of a scandal of which she was a victim, she abandoned the stage. For a number of years she resided at the Court of Ansbach. The *Mémoires d'Hippolyte Clairon et réflexions sur la déclamation théâtrale*, which she wrote in old age, were published in 1799, in Paris, where she died, four years later.

CLAIRVAUX, klâr'vō' (from Lat. *clara vallis*, fair vale; from *clarus*, clear, and *vallis*, valley). A village in the Department of Aube, France, about 10 miles above Bar-sur-Aube, on the left bank of the river Aube (Map: France, L 3). It is the site of the famous Cistercian abbey (*Clara Vallis*) founded in 1115 by Saint Bernard, who presided over it until his death, in 1153, when he was buried in the church. The abbey was suppressed during the Revolution, and the extensive buildings are now used as a penitentiary.

CLAIRVILLE, klâr'vēl', Louis François (1811-79). A French dramatic author, whose real name was Nicolaie. He was born January 28, 1811, in Lyons, but went early to Paris, and in youth had a varied practical experience with theatrical life. About 1837 he began his long series of dramatic productions, which he wrote generally in collaboration with other playwrights. Some of the more noted are the comedies *La propriété, c'est le vol* (1848), *Les tentations d'Antoinette* (1850), *Quinze heures de fiacre* (1867), and the librettos to the operas *Daphnis et Chloë*, by Offenbach (1849), and *La fille de Madame Angot*, by Lecocq (1873).

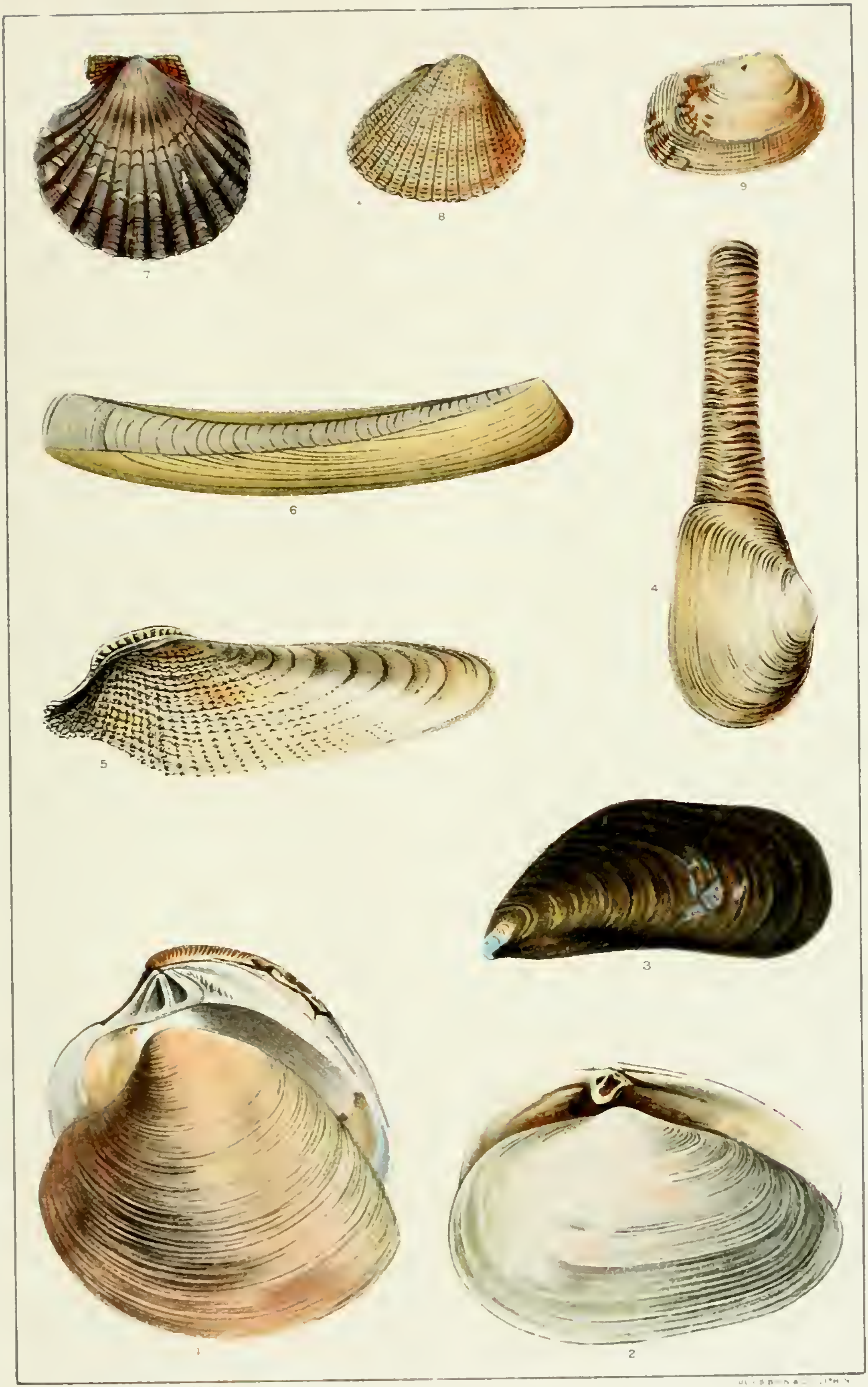
CLAIRVOY'ANCE (Fr. *clairvoyant*, clear-seeing, from *clair*, Lat. *clarus*, clear + *voir*, Lat. *videre*, to see). An alleged ability to see, in a trance state, objects and occurrences which are not discernible in the normal state. Belief in the clairvoyance of the hypnotic trance is as old as history. Socrates, Apollonius, Cicero, Pliny, Tertullian, all furnish records of the prophetic dreams and utterances of clairvoyants. In later times the visions of Swedenborg (q.v.) and Davis have become widely known.

Of the existence of the somnambulistic state of hypnosis, in which clairvoyance is said to occur most often, there can be no doubt. Suggestion (q.v.), whether it be from without (the words, passes, or other artifices of an operator), or from within (auto-suggestion, q.v.), suffices in most people to induce this state. Certain other conditions (fasting, drugs, disease, general emotional excitability) may induce an apparently spontaneous and indeterminate appearance of somnambulism. Every one is familiar with the epidemic catalepsy of the religious revival, best exhibited, perhaps, by the negroes of the South.

As to the existence of clairvoyance in somnambulism, opinions are divided. Some, with Tuttle, consider clairvoyance "an inherent faculty, a foregleam in this life of the next spiritual life." They esteem the clairvoyant as a peculiarly sensitive person, whose mind is, for the time being, directed by some departed spirit, and whose lips speak with an intelligence not their own. Others consider that the clairvoyant is able, without such direction, to see objects and occurrences beyond the ken of normal vision. Still others take a middle ground, and consider that the results are to be explained by telepathic communication, not between departed spirits and the medium, but between the minds of one or more living persons and that of the 'percipient' (*télépathie-à-trois*). Finally, many scientific men absolutely deny the presence of supernormal agencies. Consult: Flournoy, *From India to the Planet Mars* (Paris, 1900); Podmore, *Apparitions and Thought Transference* (London, 1895). See Apparitions; Ecstasy.

CLAKAMA, klȧ-kä'mȧ, **CLOCKAMA**, klō-kä'mȧ, or **KLOKAMA**. An Amerind tribe of the Chinookan stock. See Chinook.

CLAMS AND EDIBLE MUSSELS



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1 AMERICAN HARD CLAM OR QUOHOG - (VENUS MERCENARIA)
2 AMERICAN SOFT OR LONG CLAM - (MYA ARENARIA) SEE FIG 4
3 EDIBLE MUSSEL - (MYTILUS EDULIS)
4 BRITISH SOFT OR GAPER CLAM - (MYA TRUNCATA)
SHOWING EXTENDED SIPHONS
5 PIDDOCK OR DATE-FISH - (PHOLAS DACTYLUS)
6 RAZOR-CLAM - (SOLEN ENSIS)
7 SCALLOP - (PECTEN IRRADIANS)
8 COCKLE - (CARDIUM EDULE)
9 PULLET - (TAPES PULLASTRA)

CLAL'LAM, Sklalam, or Nusklala. A Salishan tribe, formerly of considerable importance, occupying the greater part of the coast extending west from Puget Sound, in Clallam County, Wash. They still number about 330, attached to the Puyallup Agency.

CLAM (older form also *clamp*, from the firm clamp of the shell, AS. *clam*, bond, OHG. *clamma*, narrow pass; cf. also Dutch *klamp*, cleat). The popular name of many widely various bivalve mollusks, especially those good to eat. In the United States it commonly designates either the quohog (*Venus mercenaria*), distinguished as the hard or round clam, or else the manninose (*Mya arenaria*), called long or soft clam. The former is a heavy, globose shell, allied to the cockles, which plows its way along sandy bottoms, standing erect upon its thin edge, and is obtained wholly by raking, in water from 10 to 40 feet in depth. It abounds from Cape Cod to Florida, and also near Shediac, New Brunswick, and is the common 'clam' of New York markets, where small ones (young) are much esteemed under the name of 'little necks,' after Little Neck, Long Island, whence they originally came. In Boston and New England the Indian name 'quohog' attaches to this, and 'clam' usually means the Mya, called 'soft clams' elsewhere. These are of a very different character, having comparatively thin, smooth, elongated shells, a protrusile, blade-like foot, adapted to digging, and siphons that may be longer than the shell. They remain sunken in the sand of the shore, between tide-marks, their siphon-mouths just at the surface, and when disturbed they eject a spurt of water as they withdraw to safer depths. These clams are obtained by digging at low tide; and they are cultivated by the protection of certain favorable areas of sea-beach, where they soon lie almost as thick as paving-stones. Formerly enormous quantities of both these clams, with razor-clams, etc., were gathered and salted in New England as bait for the cod-fisheries, but this demand has diminished. Great Britain has the 'gaper,' a closely allied species, but it is not so popular. On the New England coast two other large mollusks of deep water are eaten when obtainable, under the name of beach, sea, or surf clams—especially *Spisula solidissima*. The Southern States have a large edible species, also, in the painted clam (*Callista gigantea*). On the Pacific Coast — to which Eastern clams have been transplanted with some success, and are constantly sent, refrigerated, for immediate consumption—several edible bivalves are used, for some of which the term has been borrowed. Thus, the California 'flat clam' is a species of Semele, and others are of the genera Tapes, Saxidomus, and Glycymeris. The 'geoduck,' gathered for food by the Indians of the Northwest Coast, is *Glycymeris generosa*. The shells of most of these were formerly used by the natives in manufacturing the various beads and shell ornaments which passed as money among them. (See Shell-Money.) Inland, the word 'clam' refers to some of the many fresh-water mussels. (See Mussel.) The 'giant' clam of the East Indies (*Tridacna gigas*) is the greatest of living mollusca, its soft part amounting to 20 pounds of edible flesh, while the deeply hollowed shells may weigh 500 pounds. "In some churches of France they are employed to hold the holy water—a use which well accords with the beautiful white of the inner surface of the shell. . . . In many of the islands, stones are unknown; but, as a substitute, the natives make their knives and axes from the fragments of this shell." See Colored Plate of Clams and Edible Mussels.

Fossil Forms. The genus Mya ('soft' or 'long' clam) appeared in Tertiary time, with species that show little difference from those now living. So with the genus Mactra. The family Veneridæ, to which the little-neck clam (*Venus mercenaria*) belongs, is an old one; it began in the Middle Jurassic, with small species of rounded form, which can often with difficulty be distinguished from the accompanying species of Cyprinidæ. The genera Tapes, Cytherea, and Cyprimeria are abundant in Cretaceous rocks, Cytherea in the Eocene, and Venus in the Miocene. Shells of several species of Venus are extremely common, and finely preserved in the Miocene sands and marls of some localities in Virginia and southern Europe. For American clams of all sorts, consult: Goode, *Fishery Industries*, sec. i. (Washington, 1884); Lovell, *Edible Mollusks of Great Britain*, etc. (London, 1884). For fossil forms, see Tertiary; Miocene. See Colored Plate of Clams and Edible Mussels.

CLAM. In heraldry, a term for an escalop or cockleshell. It is supposed to indicate that the bearer has been a crusader, or has made long voyages by sea. See Heraldry.

CLAMART, klȧ'mär'. A town in the Department of Seine, France, 4½ miles southwest of Paris. It is a favorite residential suburb of Parisians, and is the seat of the Hospice Ferrari, an asylum for aged men. The Bois de Clamart, which is part of the Bois de Meudon, is a popular picnic resort of the Parisian bourgeoisie. Population, in 1901, 7391.

CLAMECY, klȧ'me-sē'. The capital of an arrondissement in the Department of Nièvre, France, at the confluence of the Yonne and the Beuvron, 38 miles northeast of Nevers (Map: France, K 4). Its parish church of Saint Martin, surmounted by a fine square tower, has interesting architectural features of the thirteenth, fifteenth, and sixteenth centuries. The twelfth-century Church of Bethlehem is now the annex of a hotel. The modern Château of Vauvert is a handsome building in fine grounds. There are manufactures of cloth, paper, leather, and pottery, and a considerable timber trade by river with Paris; a bronze bust, by Angers, of Jean Rouvet, the native who in 1549 invented the wood-raft for supplying Paris with timber, stands on a bridge spanning the river. Population, in 1901, 5426.

CLAM-CRACKER. A sting-ray. See Ray.

CLAM-GALLAS, kläm'gäl'lȧs, Eduard, Count (1805-91). An Austrian general, born at Prague. He entered the army in 1823, and became a major-general at the age of 40. In 1841 he served with distinction in the Italian and Hungarian campaigns, and in the latter commanded the Transylvanian corps which effected the union with the Russians, and thus led to the defeat of General Bem at Sepsi-Saint György and Kaszon-Ujfalu. In 1859 he fought with distinction at Magenta and Solferino, but during the disastrous campaign of 1866 he was defeated by the Prussians at Hühnerwasser, Podol, Münchengrätz, and

Gitschin; was relieved of his command and brought before a military tribunal, by which, however, he was acquitted. While he was known to have committed strategical errors, the chief responsibility for the disasters was probably traceable to his superior officers.

CLAMPING-SCREW. A tool used by carpenters and joiners for holding work on a table, or for securing two or more pieces together. Two sorts are generally found: One of two straight bars of wood or metal, each with a screw passing through, the screw-end pressing against the opposite bar; the second is a device shaped like the letter G, through the upper end of which the screw passes, and holds between its point and the lower end the portions to be clamped, generally for gluing together.

CLAN (Gael. *clann*, Ir. *clann*, *cland*, offspring, tribe. Welsh *plant*, offspring, children, Lat. *planta*, connected with Skt. *kula*, Lith. *kiltis*, family). A collection of families united under a chieftain, all claiming descent from a common stock, and possessed of a common surname. The word 'clan' has been adopted as the ethnological generic term. Synonyms and parallels have been sought in the Arabic *hayy*, the Greek γένος, *genos*, the Roman *gens*, the Russian *mir*, the German *Gemeinde*, the Swiss *almend*, the Irish *sept*, and the North American *otem* (totem). It is now well established, however, that in the primitive Indo-European organization of society several families, presumably kindred, united in a brotherhood (Greek *φρατρία*, *phratria;* South Slavonic *bratstro;* Latin *curia*, house); several brotherhoods in a tribe (Greek *φυλή*, *phylē*, South Slavonic *pleme*, Latin *tribus*); and finally several tribes in a folk, or nation (Greek *ἔθνος*, *ethnos*, Latin *populus*). Higher than the folk were loose federations merely of nations—*Völker*, or *populi*. From this scheme it is clear that the primitive 'clan' is to be identified with the brotherhood rather than with the γένος, *genos*, or gens. In fact, the Greek γένος is post-Homeric, and therefore comparatively late; doubtless it became politically important with the rise of the aristocracy. The typical Greek γένος was but a powerful family under a single leader; most probably in early Attica the chief of every noble γένος had a seat in the great aristocratic council (of the Areopagus). But some Attic *γένη*, *genē*, were mere guilds of coppersmiths, of heralds, etc. The typical Latin *gens* likewise developed from the family, as is indicated by the derivation of the gentile name from the personal name, and was also a comparatively late institution. Probably every patrician *gens* was once represented by its chief in the senate. Whereas the γένος and *gens* are thus seen to have been monarchical, the *φρατρία*, *phratria*, and the *curia* were aristocratic; the nobles held the offices and priesthoods, and doubtless controlled the votes of the commons, many of whom were clients. In all essentials the *bratstro* resembles the *gens* (γένος, *genos*) of the Greeks and Romans. The general principles of clanship were common rights and duties, with obligations to avenge one another's wrongs. The members were bound together, not only by the sentiment of common origin and blood, but also by the common worship of a protecting deity, from whom all claimed descent. After the introduction of Christianity among the Southern Slavs, a patron saint took the place of the ancestral deity, who is still celebrated in song, though shorn of his divine qualities. Much confusion has arisen from identifying the clan with the village. The basis of the clan, tribe, and folk is kinship, real or assumed; the basis of the village, *pagus*, and *civitas* is in some degree territorial—the idea of neighbor partly supplanting that of kin. In simpler words, all the villagers were not even presumably kinsmen. Thus the village was the first step in the development of political society from tribal life. No theory of exogamy, metronymy, or of patriarchal government will apply to all clans; there are indications of a great variety of primitive usage. Apart from the Southern Slavs and from sections of India, the Indo-European clan has continued most vital among the Celts, especially in the Highlands of Scotland. The feuds of the clans and the struggle between these autonomous societies, on the one hand, and the central Government on the other, made up a large part of the history of Scotland to the suppression of the Rebellion of 1745, after which the British Parliament enacted laws for the abolition of the hereditary jurisdiction of the Scottish chieftains, and for the disarming of the clans. The influence of the system still lingers, however, in remote and sparsely populated districts.

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CLANDESTINE MARRIAGE, The. A comedy by Colman and Garrick (1766), worked over from the Rev. James Townley's farce *The False Concord*.

CLANG-TINT, Explanation of. No one who is at all familiar with music has any difficulty in naming the instrument or class of instruments from which a given tone proceeds. "The same note" may be sounded, e.g. on piano, organ, violin, and harp. We recognize it as "the same" in every case; and yet it "sounds different," so that we can say, "This is the note of a pipe, this of a struck, or bowed, or plucked string." The criterion of difference, in such cases, is termed clang tint, or clang color, or timbre. The note of a musical instrument is not a pure tone (see Audition), but a mixture of tones. Strongest of the 'partial' tones is the fundamental, the lowest constituent tone: this dominates and gives name to the whole tonal mass, so that the a^1 of the above-named instruments is named a^1 and sounds as a^1 in virtue of its fundamental—a pure tone of (say) 440 vibrations in the one second. Besides the fundamental, the note contains a number of higher partials or overtones. If we represent the pitch-number of the fundamental by 1, then the pitch-numbers of the overtones stand to it in the ratios 2, 3, 4, etc.: hence a perfect musical note would contain the vibration-ratios 1 : 2 : 3 : 4 : 5 : 6 : 7 . . . . , the overtones decreasing in intensity with their height, until they finally became inaudible. The primary reason that differences of clang tint obtain is that the various musical instruments favor certain overtones, and suppress others (Helmholtz); in some cases, e.g., the resonance chamber of the instrument reinforces only the odd-numbered partials, 3, 5, etc. (clarinet); in others, a particular overtone is killed by the striking of a string at a certain fraction of its length (in most modern pianos, the sixth overtone or seventh partial is thus suppressed); in others, again, the low overtones are weak and the high are strong (bassoon, harmonium). A practiced ear is sensible of these differences as such, and can analyze the note into its tonal components. For most hearers, however, the differences exist merely as differences in the 'coloring' of the fundamental.

There are two further constituents of clang tint: (1) Different musical tones are accompanied by characteristic noises in wind instruments, by the rush or hiss of the air; in string instruments, by a scrape or thud or pluck. (2) Different musical tones begin and end in characteristic ways; the clangs of the zither are dry and short, those of the organ full and sustained; the oboe is flexible, the bombardon or bass tuba lumbers into the orchestral complex, etc. Finally, there are many secondary criteria for the recognition of musical tones: the range within which the fundamental falls, the intensity of the clang, the peculiar melodic task set to a sequence of tones, etc.

Consult: Helmholtz, *Sensations of Tone* (Eng. trans., London, 1895); Stumpf, *Tonpsychologie* (Leipzig, 1890); Titchener, *Experimental Psychology* (New York, 1901). See INSTRUMENTATION.

CLAN-NA-GAEL. An Irish secret society, founded by fanatical Irishmen in the United States, for the purpose of intimidating the British Government by violence and forcing compliance with Irish demands for home rule. It was responsible for the dynamite outrages of 1883 in London.

CLA'OSAU'RUS. See THESPESIUS.

CLAP, ROGER (1609-91). An English colonist in America; one of the founders of Dorchester, Mass. He was born in Salcomb, Devonshire, England; emigrated to New England, where he became one of the first settlers in Dorchester, in 1630, and was captain of the fort or 'castle' on Castle Island from 1665 to 1686, after which, until his death, he lived in Boston. He is best remembered for his *Memoirs*, which he prepared about 1676, but which were not published until 1731, when they appeared under the title *Memoirs of Capt. Roger Clap, Relating Some of God's Remarkable Providences to Him, in Bringing Him into New England, and Some of the Straits and Afflictions the Good People Met with Here in their Beginnings.* Six subsequent editions were published, the last appearing in 1844, as vol. i. of the *Collections of the Dorchester Antiquarian and Historical Society.* The book is of slight historical value.

CLAP, THOMAS (1703-67). An American Congregational clergyman. He was born at Scituate, Mass., June 26, 1703; graduated at Harvard, 1722; was minister at Windham, Conn., from 1726 to 1740; president of Yale College from 1740 to 1766, rendering valuable service to the institution. Through his efforts, a college building and chapel were erected. His resignation was the result of his opposition to the revival movement headed by Jonathan Edwards and George Whitefield. His ingenuity and scientific attainments are attested by his construction of the first orrery or planetarium used in America. He published sermons, letters, and tracts; *Religious Constitution of Colleges, Especially of Yale College* (1754); *History and Vindication of the Doctrines Received and Established in the Chronicles of New England* (1755); and *Annals or History of Yale College* (1766). He died in New Haven, Conn., January 7, 1767.

CLAPHAM, klăp'am. A Parliamentary district of London (q.v.), England, 4½ miles southwest of Saint Paul's Cathedral (Map: London, F 6). It is noted for one of the busiest railway centres in the world, 1200 trains passing through Clapham Junction daily.

CLAPPER RAIL, or MUD-HEN. See RAIL.

CLAP'PERTON, HUGH (1788-1827). A British explorer of Africa, born at Annan, Dumfriesshire, Scotland. He entered the navy at thirteen, served in the East Indies and off the Canadian coast, and returned to England as lieutenant in 1817. In 1822, in company with Oudney and Denham, he set out from the Mediterranean for the exploration of the interior of Africa. Early in 1823 the expedition reached Lake Chad. Thence Clapperton and Oudney struck westward to find the source of the Niger; but on the way Oudney died, and Clapperton was detained at Sokoto by the Sultan. He returned to England in 1825, was promoted to be commander, and was placed in charge of a second expedition for the exploration of the Niger. He set out from the coast of the Gulf of Guinea, his party this time consisting of Richard Lander, who published an account of his chief's experiences, and three others, who died soon after leaving the Bight of Benin. Crossing the Niger to Bussang, the two survivors reached Sokoto, where Clapperton was detained for the second time, on account of civil war, and, worn out by hardships and failure, succumbed to disease. For accounts of his explorations, consult: *Narrative of Travels and Discoveries in Northern and Central Africa, in the Years 1822, 1823, and 1824, by Major Denham, Captain Clapperton, and the Late Dr. Oudney* (London, 1826); and Lander, *Records of Captain Clapperton's Last Expedition to Africa* (London, 1830).

CLAQUE, klāk (Fr., hand clapping). A body of persons, individually known as 'claqueurs,' engaged to promote the success of a public performance by bestowing upon it preconcerted applause, and thus giving the public a false notion of the impression it has made. In principle, the claque has existed from time immemorial, since the friends of authors and actors would naturally be expected to assist with their appreciation; and tears and laughter in an audience are well known to be infectious. As a paid institution, it is traditionally counted an invention of Nero's time. According to Suetonius, the actor-emperor had a body of 5000 stalwart applauders, whose example the public were expected to follow.

It was in Paris, however, that the claque was first regularly organized into a trade. It is said to have owed its suggestion to a trick of the poet Dorat, who distributed free tickets to his dependents upon condition that they applauded. About 1820 two men named Porcher and Santon regularly established the business of insuring dramatic success (*l'assurance des succès dramatiques*) by supplying the theatres with as many 'claqueurs' as the authors or managers thought each piece would require. Since their day various *chefs de claque* have gained importance in a position which required discrimination and tact. They have relations directly with the management of the theatres, and commonly attend the last rehearsals of a piece, in order to study it in advance, and receive instructions as to the points where demonstrations are expected. Their assistants are, as a rule, picked up merely for each occasion. The main body of the claque sits generally near the rear of the middle of the parterre, beneath the chandelier, from which they have been called *chevaliers du lustre*. Others are distributed in different parts of the house, according to their particular functions, which illustrates how minutely the art is organized. Thus, the connoisseur is bound to learn the play by heart, and call the attention of the audience about him to the fine points; the *rieur* or *rigolard* must laugh at every jest; the *pleureur* ('weeper') has to manifest his sensibility at the moving passages. This last part is generally assigned to women, in whom the frequent use of the handkerchief seems most natural. The *chatouilleur* ('tickler'), on the other hand, endeavors, by distributing bonbons, theatre-bills, etc., and by lively conversation, to keep his neighbors in good humor; and, lastly, the *bisseur* calls '*bis!*' with the utmost enthusiasm, at the conclusion of the specified pieces of music.

The following incident, which found its way into the newspapers on the occasion of the death of the famous French actress Rachel, shows the ludicrous seriousness with which the members of the claque view their singular profession: Mademoiselle Rachel had just created a new character in a modern piece, and during the first evening was loudly applauded. The next, however, she thought her reception by no means so warm, and she complained that the claque did not do its duty. Its leader, on hearing of Rachel's dissatisfaction, wrote to her as follows: "Mademoiselle—I cannot remain under the obloquy of a reproach from such lips as yours! The following is an authentic statement of what really took place: At the first representation, I led the attack in person not less than thirty-three times. We had three acclamations, four hilarities, two thrilling movements, four renewals of applause, and two indefinite explosions. In fact, to such an extent did we carry our applause, that the occupants of the stalls were scandalized, and cried out *A la porte!* My men were positively exhausted with fatigue, and even intimated to me that they could not again go through such an evening. Seeing such to be the case, I applied for the manuscript, and, after having profoundly studied the piece, I was obliged to make up my mind for the second representation to certain curtailments in the service of my men. I applied them, however, only to MM. ——, and if the *ad interim* office I hold affords me the opportunity, I will make them ample amends. In such a situation as that which I have just depicted, I have only to request you to believe firmly in my profound admiration and respectful zeal; and I venture to entreat you to have some consideration for the difficulties which environ me." In spite of the comic side of the business, the public is generally hostile, and there have been actual riots owing to ill-timed efforts of the claque to overcome popular disapproval of a play. Occasional efforts have been made, with partial success, for the abolition of the claque; but it still commonly prevails, and plausible arguments are urged in its justification.

The allegation that, in London, theatrical artists and managers are obliged to endeavor to insure success by means of a similar institution is strenuously denied, although there, and in Germany and the United States, similar artifices, not so publicly organized, are practiced to some extent.

CLAR'A. (1) A character in Otway's adaptation, *Cheats of Scapin*, corresponding to Hyacinthe in Molière's *Fourberies de Scapin*. (2) Ferdinand's mistress in Sheridan's *The Duenna*.

CLARAC, klä'räk', Charles Othon Frédéric Jean Baptiste, Comte de (1777-1847). A French artist and antiquarian. He superintended for a time the excavations at Pompeii, of which he gave an account in *Fouilles faites à Pompéi* (1813); was a member of the French Embassy in Brazil; and on returning to Paris was made keeper of the Museum of Antiquities in the Louvre, of which he published a catalogue. Others of his works are *Manuel de l'histoire de l'art chez les anciens* (1847), and *Musée de sculpture antique et moderne* (1826-52). The latter, an inventory of all the principal monuments in marble and bronze preserved in the various museums of Europe, is still consulted by archæologists, and has been valuable for its promotion of the study of antique art in France.

CLÄRCHEN, klĕrĸ'en. A country maiden in love with Egmont, in Goethe's *Egmont*. After his death she poisons herself.

CLARE (Ir., plain; Welsh *clawr*; connected with Gk. κλῆρος, *klēros*, lot). A maritime county in the Province of Munster, Ireland, bounded north by Galway and Galway Bay; east and south by the Shannon and its expansion, Lough Derg, separating it from Tipperary, Limerick, and Kerry; west by the Atlantic (Map: Ireland, B 4). Area, 1294 square miles—more than half being arable, and only a small part in wood. The surface is mostly hilly, with some mountains, bogs, marshes, and rugged pastures. The southwest third of the county forms part of the Munster coal-field. Fine sheep and cattle are raised on the pastures. There are fishing interests and manufactures of frieze and hosiery. The chief town is Ennis, the county-town. Population, in 1841, 286,500; in 1851, 212,700; in 1891, 126,244; in 1901, 112,100. Consult Frost, *History and Topography of the County of Clare* (Dublin, 1893).

CLARE, or **CLARA,** Saint (1191-1253). The founder of the Order of Poor Clares, the Franciscan Order for women. She was a member of a rich and noble family of Assisi, in the Duchy of Spoleto. Attracted by the eloquence and piety of Saint Francis of Assisi, she abandoned the pleasures of social life, in which she had previously indulged, and betook herself to solitude, prayer, and mystic meditation. With the advice of Saint Francis she founded her Order in 1212, and, after obtaining a great reputation for sanctity, died at Assisi, August 11, 1253. Two years afterwards she was canonized by Pope Alexander IV. (See Clares, Poor.) Consult Demore, *Vie de Sainte Claire d'Assisi* (Paris, 1856).

CLARE, Ada. A rather insipid girl in Dickens's *Bleak House*, friend of Esther, who later marries the optimistic Carstone. Both she and her husband are wards in chancery, and heirs in the Jarndyce will case.

CLARE, Lady Clare de. An heiress in Scott's poem *Marmion*, whose lover is ruined by Marmion.

CLARE, John (1793-1864). An English peasant poet. Born, July 13, 1793, at Helpstone, near Peterborough, he was taken from school at seven and employed on a farm, paying for such education as his meagre wages would allow. He became a servant in a public-house; was apprenticed to a gardener; ran away, enlisted in the militia, lived among the gypsies; worked as a lime-burner, and at one time was compelled to seek parish relief. In 1821 he published *Poems Descriptive of Rural Life and Scenery*, and later in the same year his *Village Minstrel and Other Poems*. He became famous, was patronized and flattered, fell into dangerous habits, and, becoming insane, died in a private asylum, May 20, 1864. Though helped much by his friends, Clare was always poor. When very young he learned old songs, which first led him to verse-making. Afterwards he came across Thomson's *Seasons*, which he read constantly. His poems deal with rustic scenes and the incidents of village life. They are spontaneous and musical, but lack vigor. For his life, consult: Martin (London, 1865), and Cherry, *Life and Remains* (London, 1873).

CLARE COLLEGE. One of the colleges of the University of Cambridge. It was founded as 'University Hall' by the university in 1326. Ten years later its 'advocacy' or patronage was made over to Elizabeth de Burgh, Countess of Clare, by the chancellor of the university, Richard de Baden. Part of the great estates she had inherited by the death of her brother at Bannockburn she devoted to refounding this hall, first as Clare Hall, with the particular object of educating clergy to take the place of those swept off by the plague. In later generations the college departed from this pious purpose somewhat, though it was especially noted in the sixteenth and seventeenth centuries for its divines, who were learned, if somewhat too liberal-minded for their times. Bishop Latimer was a fellow of the college, as was Archbishop Tillotson; Cudworth was master, and among the other members of the seventeenth century may be noted William Whiston and Thomas Burnet. Wheelock, the Anglo-Saxon scholar, and Masères, the mathematician, were also members of Clare. The buildings of the college have suffered very frequently from fire. The present quadrangle, one of the most beautiful in Cambridge, was begun in the seventeenth century; but the work was interrupted by the Civil War, and it was not completed till 1715. The present foundation is a master, 18 fellows, 24 residents, and two non-resident scholars, besides undergraduates.

CLARE ISLAND. An island off the west coast of Mayo, Ireland, at the entrance of Clew Bay (Map: Ireland, A 3). It has a length of four and a half miles, with a breadth of two miles. On its northeast extremity there is a lighthouse at an elevation of 487 feet above the sea. Population, 1000.

CLARE′MONT (Fr., 'fair mount'). A mansion at Esher, in Surrey, England, 15 miles southwest of London. It was the home of Prince Leopold of Saxe-Coburg (later King of the Belgians) in the early part of the nineteenth century, and from 1848 to 1850 the residence of the exiled Louis Philippe, King of the French, who died there. In consequence, Claremont became the headquarters of the Orléans Party.

CLAREMONT. A village in Los Angeles County, Cal., 37 miles east of Los Angeles; on the Atchison, Topeka and Santa Fé Railroad (Map: California, E 4). It is in the centre of a fruit-growing region, producing especially oranges and lemons, and is the seat of Pomona College (Congregational), established in 1888. Population, less than a thousand.

CLAREMONT. A town in Sullivan County, N. H., 50 miles northwest of Concord; on the Boston and Maine Railroad (Map: New Hampshire, E 8). It is also on the Sugar River, which furnishes abundant water-power. The town has manufactures of cotton and woolen goods, paper, diamond-drills, machinery, machinery supplies, shoes, brick, lumber, brooms, and brushes, and there are also granite and marble yards. Claremont contains the Fiske Free Library, founded in 1873. Population, in 1890, 5565; in 1900, 6498.

CLAR′ENCE, Duke of. A title occasionally given to a younger member of the British royal family. It was first bestowed on Lionel, the second son of Edward III. In recent years it was held by Albert Victor Christian Edward (1864-92), the eldest son of King Edward VII., then Prince of Wales.

CLARENCE, Fitzroy. One of Thackeray's various *noms-de-plume*.

CLARENCIEUX, klâr′en-shōō *or* -sū. An English heraldic officer, the first of the two provincial kings-of-arms, the second being Norroy. The jurisdiction of Clarencieux extends over all England south of the Trent, that of Norroy comprehending the portion north of that river. Clarencieux is named after the Duke of Clarence, third son of King Edward III. It is his duty to visit his province, to survey the arms of all persons bearing coat armor within it, to register descents and marriages, and to marshal the funerals of all persons who are not under the direction of Garter. He also grants arms within his province, with the approval of the Earl Marshal. See Garter King-of-Arms; Heralds' College; King-at-Arms.

CLAR'ENDON. A town and the county-seat of Monroe County, Ark., 60 miles east of Little Rock; on the White River and on the Saint Louis and Southwestern, and the Arkansas Midland railroads (Map: Arkansas, D 3). It is surrounded by an agricultural and lumbering region, and has lumber-mills, stave and wagon factories, foundry, cotton-gin, shoe-last factory, etc. Population, in 1890, 1060; in 1900, 1840.

CLARENDON. A town in Rutland County, Vt., five miles south of Rutland; on the Rutland Railroad (Map: Vermont, B 7). The principal industries are dairying, fruit-raising, and sugar-making. The locality is visited for its mineral springs, the waters of which are of considerable medicinal value. The government is administered by an annual town-meeting. Population, in 1890, 928; in 1900, 915.

CLARENDON. A lodge in Wiltshire, near Salisbury, England, where the 'Constitutions of Clarendon,' fixing the limits of the jurisdiction of the civil and ecclesiastical courts, were drawn up in 1164.

CLARENDON, Assize of. In English history, a royal decree issued in 1166, reëstablishing the system of mutual responsibility, or frank-pledge (q.v.), among the inhabitants of each village. Twelve men from each hundred were clothed with powers similar to those of a grand jury. Consult Stubbs, *Select Charters Illustrative of English History* (7th ed., Oxford, 1890).

CLARENDON, Constitutions of. A body of laws defining the spheres of ecclesiastical and secular jurisdiction in the courts of England, adopted in 1164. In that year Henry II. summoned the whole body of bishops and barons to a council at Clarendon, and some of the oldest members of the council were ordered to set down in writing the customs in use under Henry I. The report was to be made the basis for the definite determination of the disputes between the King and the clergy. The document known as the 'Constitutions of Clarendon' was presented as the result of the inquiry. The constitutions were sixteen in number. The substance of the most important articles was as follows: Members of the clergy accused of crime should be sent to the ecclesiastical courts for trial, and, if there convicted, were to be turned over to the law courts for further punishment. There was to be no appeal to Rome without the consent of the *Curia Regis*, which court also determined what matters were to be decided by the ecclesiastical tribunals. No beneficed clergyman might leave the realm without the King's consent. No villein could be ordained without the consent of his lord, and no tenant-in-chief of the King could be excommunicated without the King's knowledge. In addition to these more important subjects, the 'constitutions' decided the questions of advowson and presentation, baronial titles of prelates, election to bishoprics and abbacies, and the right of the King to goods of felons deposited under the protection of the Church. Finally, the questions of titles to ecclesiastical estates, the trial of laymen for spiritual offenses, and the bestowal of churches in the King's gift were determined.

A great authority upon the 'Constitutions of Clarendon' says: "They are no mere engine of tyranny, or secular spite, against a churchman; they are really a part of a great scheme of administrative reform, by which the debatable ground between the spiritual and temporal powers can be brought within the reach of common justice, and the lawlessness arising from professional jealousies abolished." The enactment of the 'Constitutions of Clarendon' brought to a crisis the dispute between Henry II. and Thomas à Becket (q.v.), who made himself the champion of the ecclesiastical power, siding with Pope Alexander III. when the latter rejected the 'constitutions.' Though the King had to undergo penance after the murder of Becket, most of the provisions of the 'Constitutions of Clarendon' remained permanent gains to the civil power. Consult: Stubbs, *The Constitutional History of England* (Oxford, 1874-78); Pauli, *Geschichte von England* (Gotha, 1853-58); and for the text of the 'Constitutions,' Stubbs, *Select Charters Illustrative of English Constitutional History* (7th ed., Oxford, 1890).

CLARENDON, Edward Hyde, Earl of (1609-74). An English historian, and Chancellor of Charles II. The son of Henry Hyde, a private gentleman, he was born at Dinton, Wiltshire, February 18, 1609. Destined for the Church, he proceeded to Magdalen College, Oxford, where he was graduated Bachelor of Arts, February 14, 1626. But instead of the clerical profession, he entered the Middle Temple, under his uncle, Chief Justice Sir Nicholas Hyde, treasurer of the society, and was called to the bar November 22, 1633. With a leaning to letters rather than law, his intimate friends were the brilliant *literati* of the period—Ben Jonson, Waller, Selden, Carew, Chillingworth, Hales, Falkland, and others. To them in after-years he attributed much of his knowledge and worldly experience. He was twice married—his first wife dying after six months—and by both alliances gained pecuniary and political influence. In 1634 he became Keeper of the Writs and Rolls of the Common Pleas, and by some brilliant defense work acquired an extensive law practice. He came into high favor with Laud, and was frequently consulted by him. He entered the 'Short Parliament' of 1640 for Wootton Bassett, and distinguished himself as a supporter of the Popular Party. He represented Saltash in the 'Long Parliament,' but as an Episcopalian he eventually seceded from the Popular Party on ecclesiastical questions, and thereby gained the King's favor. He headed the Royalist Party in the Commons, and counseled conciliation by a persistent appeal to the 'known laws of the land.' He was the author of most of the King's answers to the Parliamentary manifestoes. At the outbreak of the Civil War he attached himself to the Royal cause, and in 1643 was knighted and made Chancellor of the Exchequer and Privy Councilor. After viewing the battle of Edgehill he joined Prince Charles (Charles II.) in the West, and accompanied him in his flight to Jersey. He remained in that island for two years, and began his *History of the Rebellion.* In June, 1648, after capture and spoliation by an Ostend pirate, he rejoined Prince

Charles at The Hague. He exerted himself to save the life of Charles I., and after that monarch's execution was retained as counselor by Charles II., in 1649, going to Spain on an unsuccessful mission for assistance. At Charles's request he rejoined him in Paris, and as the King's most trusted adviser there, as also in Cologne and Bruges, spent the next nine years, frequently in abject poverty. Charles formally declared him Lord Chancellor in 1658. Two years later his daughter Anne formed a secret marriage with the Duke of York, afterwards James II., and subsequently became the mother of Mary and Anne, the future English queens. The King and Clarendon were wroth; but Clarendon's indignation was somewhat overacted, and excited an after-suspicion that he deliberately proposed the barren Catharine of Braganza as Charles II.'s consort, to provide for his posterity's succession to the throne. At the Restoration Charles confirmed his appointment as Lord Chancellor, against violent opposition, and in November, 1660, created him Baron Hyde. The same year he was elected chancellor of Oxford University, and the April following became Viscount Cornbury and Earl of Clarendon. During his Premiership the settlement of Scotland and Ireland owed much to him, and he took a leading part in colonial extension. He was one of the eight proprietors to whom the first Carolina Charter was granted in 1663, the Cape Fear establishment being named 'Clarendon County,' after him. He also helped the Presbyterian Baxter, to whom he offered a bishopric, in the incorporation of a company for the propagation of the Gospel in New England. The ill success of the Dutch War and the sale of Dunkirk to the French aroused public indignation, and he became exceedingly unpopular. In 1663 the Earl of Bristol unsuccessfully accused him of bribery in the House of Lords, but in 1667 he fell a victim to Court intrigue; and having offended the King by opposing his divorce, that he might marry Fanny Stewart, whom Clarendon induced the Duke of Richmond to wed, Charles deprived him of his offices, and indirectly advised him to withdraw to Calais. Clarendon sent a vindication to the Lords, which both Houses of Parliament ordered to be burned by the common hangman. After being almost murdered by some English sailors at Evreux, he lived in exile for six years, sending humble appeals to be allowed to pass his remaining years on English soil. He died in Rouen, December 9, 1674, and was buried in Westminster Abbey.

In a generally profligate Court he was almost the only moral man, and was distinguished for his unswerving fidelity to the Episcopal Church and his determined maintenance of what he considered the true and ideal English Constitution. He was a ready debater and pleasing speaker, but it is for his literary productions that he is best remembered. The first edition of his great *History of the Rebellion* (Oxford, 1702-04) was not printed from the original manuscript, and some passages were slightly altered by the editors. A complete edition, by Dr. Bandinel, first appeared in 1826; while the best edition, in 6 vols., was published at Oxford in 1888. He wrote also a *Life of Edward Hyde, Earl of Clarendon*, with a *Continuation of the History of the Grand Rebellion from the Restoration to His Banishment in 1667* (1759); and a *History of the Rebellion and Civil War in Ireland* (1720). Consult: Agar-Ellis, *Historical Inquiry Respecting the Character of Edward Hyde, Earl of Clarendon* (London, 1827); Lister, *Life and Administration of Edward Hyde, First Earl of Clarendon* (London, 1837-38); Lewis, *Lives of the Friends and Contemporaries of Clarendon* (3 vols., London, 1852); Campbell, *Lives of the Lords Chancellors*, vol. iii. (London, 1869); Oldmixon, *Clarendon and Whitelocke Compared* (2d ed., London, 1787); and the histories of Green, Ranke, and Gardiner.

CLARENDON, George William Frederick Villiers, fourth Earl of (1800-70). An English diplomat and statesman, the eldest son of George Villiers and grandson of Thomas Villiers, who in 1752 married the heiress of the last Lord Clarendon of the Hyde branch, and was created Baron Hyde, 1756, and Earl of Clarendon, 1776. He was born in London, January 12, 1800. He entered Saint John's College, Cambridge, in his sixteenth year, and by titular privilege attained the M.A. degree in 1820. The same year he entered the diplomatic service as an attaché to the British Embassy at Saint Petersburg, and by twenty-three years of age had acquired practical experience that was of particular value in his subsequent career. He was an accomplished linguist and writer. Appointed Commissioner of Customs in 1823, in 1827-29 he gained administrative knowledge in arranging the union of the English and Irish excise boards, and an insight into Irish character and affairs which made him an authority with Lord Lieutenant Paget, Marquis of Anglesey. In 1831, as coadjutor to Sir John Bowring, he successfully negotiated a commercial treaty with France, and in 1833 was sent as envoy extraordinary and minister plenipotentiary to Madrid, where he acquired great influence and a lifelong popularity. He was rewarded with the Grand Cross of the Bath in 1837, and at his uncle's death, December 22, 1838, succeeding to the Clarendon peerage as fourth Earl, he returned to England to take his seat in the House of Lords. He entered Lord Melbourne's Administration as Lord Privy Seal in 1840, and also became Chancellor of the Duchy of Lancaster. When the Ministry fell, in 1841, he became an active member of the Opposition, but, as a stanch free-trader, warmly supported Sir Robert Peel's measures for the repeal of the Corn Laws. Under Lord Russell he became president of the Board of Trade, in 1846, and in the following year was appointed Lord Lieutenant of Ireland. The insurrectionary follies of Smith O'Brien and his followers were agitating the country; but Clarendon's prompt and decisive measures soon restored tranquillity, while his tact and impartiality allayed party feeling. From 1852, under Lord Aberdeen, and in 1855-58, under Lord Palmerston, Clarendon was Foreign Secretary. Upon him fell the onus of the Crimean War; and the peace of 1856, with its beneficial results to European politics, testifies to his foresight and ability. He retired with the Ministry in 1858; resumed the Foreign Secretaryship in 1865-66, and held it again under Gladstone from 1868 until his sudden death, June 27, 1870. Consult Thornton, *Life of George William Frederick Villiers, Fourth*

Earl of Clarendon, in *Foreign Secretaries of the Nineteenth Century*, vol. iii. (London, 1881-82).

CLARENDON PRESS. A printing and publishing establishment connected with Oxford University (England). It was founded in 1672, and named Clarendon, because the printing-house was paid for by the profits on the sale of Lord Clarendon's *History of the Rebellion*, of which work the university has a perpetual copyright.

CLARENS, klȧ'räɴ'. A village and health resort in the Canton of Vaud, Switzerland; on the Lake of Geneva, 1200 feet above sea-level, and five miles east of Vevey (Map: Switzerland, A 2). The town is charmingly situated, has a mild climate, and is a favorite resort for invalids. It is known as the scene of Rousseau's *La Nouvelle Héloïse*.

CLARES, klârz, Poor, or Clarisses. A religious order founded by Saint Clare, with the counsel and help of Saint Francis of Assisi, in 1212. At first, the nuns observed the rule of Saint Benedict, but in 1224 the austerity of this rule was mitigated by Saint Francis, and again modified by Urban IV. in 1264. The Order rapidly increased, and by the end of the sixteenth century numbered nearly 50,000. The nuns devote themselves chiefly to the education of the young. They are under the jurisdiction of the General and Provincials of the Friars Minor. In 1875 the first Poor Clares came to the United States from Rome; in 1877 others came from Germany. They had in 1900, in the United States, five convents and 71 professed sisters; in England, six convents; in Scotland, one; and in Ireland, seven. The English follow the reform of Saint Colette, who in 1436 brought back many French, Belgian, and German converts to the strict Franciscan rule.

CLARET. See Wine.

CLARETIE, klär'tē', Jules (properly Arsène Arnaud) (1840—). A French author and theatrical manager, born at Limoges (Haute-Vienne). He studied at the Lycée Bonaparte of Paris, and became known as a feuilletonist and dramatic critic. During the Franco-Prussian War he acted as correspondent for Paris papers for a brief period. His first play won but moderate success (*La famille des Gueux*, 1869), but subsequently dramatizations of several of his own works of fiction, such as *Les Muscadins* (2 vols., 1874; presented in that year), and *Le Prince Zilah* (1884; presented in 1885), established him upon the French stage. In 1885 he became director of the *Comédie française*, whose traditional excellence he sought to maintain. He is best known, however, for his novels and historical works. Among the former are *L'Assassin* (1866), *Monsieur le Ministre* (1882), *Puyjoli* (1890), and *L'Accusateur* (1897). From the latter may be cited *Cinq ans après* (1876), a study of post-bellum conditions in Alsace-Lorraine, and *Les Prussiens chez eux* (1872). In 1888 Claretie was elected to the Académie Française.

CLARI, klä'rē, Giovanni Carlo Maria (1669-c.1754). An Italian composer, pupil of Colonna at Bologna. He became chapelmaster at Pisa, where he died. His church-music, comprising psalms, masses, a requiem, and three oratorios, ranks among the best of his time. He also composed the opera *Il savio delirante*, but is famous particularly for his madrigals, in which branch of vocal composition he was surpassed only by Steffani. Collections of these duetti and terzetti were published in 1720, 1740, and 1743.

CLARI, THE MAID OF MILAN. An opera by Sir Henry Bishop (1823), introducing John Howard Payne's "Home, Sweet Home," which was written expressly for it.

CLAR'IBEL. See Barnard, Charlotte Alington.

CLARIBEL. (1) Phaon's lady love in Spenser's *Faerie Queene*. Philemon maligns her and she is killed by Phaon, who slays Philemon also on discovering the deception. (2) One of Alfred Tennyson's earliest poems (1830).

CLARIBEL, Sir. One of the four knights who, in Spenser's *Faerie Queene*, fight for the false Florimel, and also encounter Britomart.

CLARICE, klăr'ĭs, *Fr. pron.* klȧ'rēs'. *It. pron.* klȧ-rē'chȧ. The wife of Rinaldo and sister of Huon of Bordeaux, in the romances of Ariosto and Boiardo.

CLARIFICATION. See Fining.

CLAR'IN or **CLARIN'.** In Spenser's *Faerie Queene*, a confidential companion of the Amazonian Queen Radigund. Sent by Radigund to win over the captive Sir Artegal, she falls in love with him herself, and is false to her mistress.

CLARIN'DA. A city and the county-seat of Page County, Iowa, 75 miles southeast of Council Bluffs; on the Nodaway River, and on the Chicago, Burlington and Quincy, and other railroads (Map: Iowa, B 4). It is in an agricultural and stock-raising region, which has also valuable coal deposits; exports live stock, poultry, butter, eggs, seeds, grain, and coal, and contains flour-mills, carriage-works, brick-works, foundry, creamery, cold-storage plant, etc. The State Asylum for the Insane is a short distance from the city. Population, in 1890, 3262; in 1900, 3276.

CLARINDA. (1) In Massinger's *Maid of Honor*, the maid of Carinola. (2) The maid of Calista in Fletcher's *Lover's Progress*. (3) The enamored of Colonel Manly in Mrs. Centlivre's *The Beau's Duel*. (4) The fickle mistress of Cleremont in Cibber's *The Double Gallant*. (5) The mistress of Longvil in Shadwell's *The Virtuoso*.

CLARINET (Fr. *clarinette*, from It. *clarinetto*, dim. of *clarino*, clarion, from *claro*, Lat. *clarus*, clear), or Clarionet. A wood-wind instrument of the reed kind, developed by Joseph Christopher Denner, in Nuremberg, in 1690, from the chalumeau, a primitive wind instrument, by the addition at the nodal point of a small hole and key, which gave an additional register, one-twelfth higher. Its tone is produced by a thin piece of Spanish reed nicely flattened and tied, or otherwise fixed to the mouthpiece. On the body of the instrument there are 18 holes, 13 of them with keys for the fingers of the performer, by which the notes are produced. In extent (3½ octaves), fullness, and variety of tone, the clarinet is the most perfect of wind instruments. Its construction, however, does not admit of every key in music being played on the same instrument; for which reason clarinets of different pitch, generally A, B♭, and C, also a bass clarinet (usually in B♭) are used in orchestra music. Mozart's familiar E♭ major symphony is the first work of its kind in which clarinets were employed. See Orchestra.

CLAR'INGTON, Sir Arthur. A profligate in Dekker and Ford's *Witch of Edmonton.*

CLARIS'SA. The wife of Gripe, in Vanbrugh's comedy *The Confederacy,* a would-be fine lady, in awe of the upper classes.

CLARISSA HAR'LOWE. A novel, in the form of a series of letters, by Samuel Richardson, published in 1748. See Harlowe, Clarissa.

CLARK, Abraham (1726-94). An American patriot, one of the signers of the Declaration of Independence. He was born near Elizabeth, N. J.; received a scant education; practiced law for a time; and, on the approach of the Revolutionary War, actively identified himself with the patriot cause. He was elected to the Provincial Congress in 1775; was a member of the Continental Congress in 1776-78, 1780-83, and 1785-88; was a delegate to the Annapolis Convention (q.v.) in 1786, and from 1791 until his death was a member of Congress.

CLARK, Alonzo (1807-87). An American physician. He was born in Chester, Mass., and graduated in 1828 at Williams, and in 1835 at the New York College of Physicians and Surgeons, where he was professor of physiology and pathology from 1848 to 1855, and of pathology and practical medicine from 1855 to 1885. From 1875 to 1885 he was also dean and president of the faculty. He wrote a number of papers on medical subjects for the magazines.

CLARK, Alonzo Howard (1850—). An American ichthyologist, born in Boston. He studied at Wesleyan University; in 1883 was a member of the United States Commission at the International Fisheries Exhibition, London, and in 1889 was sent as expert commissioner to the Paris Exposition of that year. In 1889 he became an assistant secretary of the American Historical Association. His publications, which have appeared principally in the form of Government reports, include: *Statistics of Fisheries of Massachusetts* (1882); *History of the Mackerel Fishery* (1883); and other similar works.

CLARK, Alvan (1808-87). An American optician, born at Ashfield, Mass. The son of a farmer, he became a self-taught engraver, portrait-painter, and optician, and was employed as an engraver in a calico-print manufactory at Lowell, Mass. He began the manufacture of telescopes about 1844, and completed the first achromatic lenses made in the United States. He also devised an ingenious eyepiece for measuring celestial arcs of lesser magnitudes. The chief telescopes of recent times have been the work of his establishment at Cambridgeport, Mass. *The Proceedings of the Royal Astronomical Society,* vol. xvii. (London, 1857), contains the list of his own discoveries with his telescopes. See Telescope.

CLARK, Alvan Graham (1832-97). An American optician and astronomer, born at Fall River, Mass. He attained a fame equal to that of his father, Alvan Clark, with whom he was associated. Among the great telescope-lenses made by him are those in the Lick Observatory in California (36 inches in diameter), and in the Naval Observatory at Washington (26 inches); the 30-inch refractor for the Imperial Observatory of Saint Petersburg; and the great 40-inch lens, the largest ever made, for the Yerkes Observatory (at Williams Bay, Wis.) of the University of Chicago. He was also active as an astronomical observer, and made many discoveries of double stars, including that of the companion of Sirius, for which he received the Lalande gold medal of the French Academy. He was a member of the eclipse expeditions to Jerez, Spain, in 1870, and to Wyoming, in 1878. Many improvements in connection with telescope manufacture were introduced by him. See Telescope.

CLARK, Daniel (1835—). A Canadian physician. He was born at Granton, Inverness-shire, Scotland; went to Canada in 1841, and graduated at Victoria University in 1858. He subsequently received from the University of Toronto the degree of M.D., studied at Edinburgh, and practiced at Princeton, Ontario. During the Civil War he was for a short time attached as volunteer surgeon to the Army of the Potomac, and in 1872 was elected a member of the Ontario Medical Council. He has since been connected with various educational and charitable institutions, and in 1875 was appointed superintendent of the Provincial Lunatic Asylum, Toronto. He has published *Pen Photographs* (1873); *John Garth,* a novel; and other works.

CLARK, Edward (1822—). An American architect, born in Philadelphia, Pa. He succeeded Thomas U. Walter as architect of the United States Capitol extension in 1865. He was appointed by Congress on the commission for the completion of the Washington Monument, and on the commission for the construction of the Congressional Library, and did other governmental work. He was chosen a member of the American Institute of Architects, fellow of the Clarendon Historical Society of Edinburgh, and trustee of the Corcoran Art Gallery, in Washington, D. C.

CLARK, Edwin Charles (1835—). An English barrister and educator. He graduated at Trinity College, Cambridge; became a scholar and fellow of Trinity, and subsequently was appointed regius professor of civil law at Cambridge. He has published: *Early Roman Law: Regal Period* (1872); *An Analysis of Criminal Liability* (1880); *Practical Jurisprudence* (1883); and *Cambridge Legal Studies* (1888).

CLARK, Francis Edward (1851—). An American Congregational clergyman. He was born at Aylmer, Canada, September 12, 1851; graduated at Dartmouth College in 1873, and at Andover Theological Seminary in 1876. He held a Congregational pastorate at Portland, Maine, from 1876 to 1883, and was pastor of Phillips Church, South Boston, from 1883 to 1887. In 1881 he organized the Williston Young People's Society of Christian Endeavor in his church, and in 1887 became president of the United Society of Christian Endeavor, which sprang from it, and editor of its official organ, *The Golden Rule.* (See Christian Endeavor, Society of.) He has published: *The Children of the Church, and the Y. P. S. C. E. as a Means of Bringing Them Together* (1888); *World-wide Endeavor, the Story of the Y. P. S. C. E. from the Beginning and in All Lands* (1896); *Fellow-Travelers: a Personally Conducted Journey in Three Continents; A New Way Around the World*

(1901), an account of experiences on the Trans-Siberian Railway; and other minor works in the interest of the Society.

CLARK, George Rogers (1752-1818). An American soldier and frontiersman, who rendered valuable services to the United States during the Revolutionary War. He was born near Monticello, in Albemarle County, Va.; received a common-school education; made a tour west of the Alleghanies in 1772; became a land surveyor, and in 1774 served against the Indians in Lord Dunmore's War (q.v.). He spent some months in Kentucky in 1775; removed thither early in 1776, and soon became the recognized leader of the backwoodsmen. In June, 1776, he was chosen one of two delegates to represent Kentucky, then a district of Virginia, in the Virginia Legislature, and in this capacity not only brought about the organization of Kentucky as a separate county, but secured a large supply of much-needed powder for the use of the backwoodsmen. After his return, he conceived a plan for the conquest of the 'Illinois Country,' and having won the support of Patrick Henry, then Governor of Virginia (to lay his plans before whom he had traveled on foot from Harrodsburg, Ky., to Williamsburg, Va.), he was appointed lieutenant-colonel, raised the necessary troops, and proceeded to the site of Louisville, Ky. Starting from this point on June 28, 1778, he captured Kaskaskia (q.v.) on July 4, and by deputy secured the surrender of the other French villages, Cahokia and Vincennes. General Hamilton, the English commander at Detroit, recaptured Vincennes, then held by Captain Helm, in December; and Clark, upon hearing the news at Kaskaskia, put himself at the head of 170 men, and after an arduous march in the depth of winter, through swamps and dense forests, forced Hamilton to surrender, on February 24, 1779. Early in 1780 he built Fort Jefferson, on the left bank of the Mississippi, a short distance below the mouth of the Ohio. From this time until the close of the war, he was engaged almost constantly in warfare against the British and Indians, totally defeating the Shawnees, destroying the Indian villages along the Big Miami, and rising to the rank of brigadier-general of Virginia militia. After the close of the war he led an unsuccessful expedition against the Wabash Indians in 1786, came into conflict with the Spanish authorities in the West, and seems to have advocated an expedition, which he was to lead, for the capture of Natchez and Saint Louis and the opening of the Mississippi to unrestricted navigation. In 1793, during the pro-French agitation in the United States, he was commissioned a general by the French Government, and issued a call for volunteers for the purpose of reconquering the Spanish possessions along the Mississippi on behalf of the French. He passed the latter part of his life in poverty at Clarkesville, in Indiana, near Louisville, Ky., on part of the land granted him by the Virginia Legislature.

Clark's services during the Revolutionary War were of the utmost value to the United States Government, inasmuch as the virtual conquest of the Northwest served as, perhaps, the chief basis of the American claim, in the peace negotiations of 1782-83, to the territory between the Mississippi and the Alleghanies. But for this conquest, according to many historians, the western territory would probably have passed either to England or to Spain. In recognition of his services, the Virginia Legislature, in 1783, granted him a tract of 8049 acres—140,000 more being granted to his officers and men—in the present State of Indiana, and on two occasions presented him with a sword. Clark wrote two accounts of his expedition—one of which, his *Letter to George Mason, of Virginia,* was first published in Cincinnati in 1869; and the other, entitled his *Memoir,* and written probably in his old age, at the request, it is said, of Presidents Jefferson and Madison, was first published in part in Dillon's *Indiana* (1843). Consult: English, *The Conquest of the Country Northwest of the Ohio River, 1778-83, and Life of George Rogers Clark* (Indianapolis, 1896); and Roosevelt, *Winning of the West,* vols. i. and ii. (New York, 1889). Many documents relating to Clark and the conquest of the Illinois country are to be found among the Draper Manuscripts, in the Library of the Wisconsin Historical Society, Madison, Wis.

CLARK, Henry James (1826-73). An American naturalist, born at Amherst, Mass. He received his education at New York University; then studied botany under Asa Gray at the Cambridge Garden, and later under Agassiz at Harvard. On graduating from the Lawrence Scientific School, he remained with Agassiz, in the capacity of private assistant, until 1860, when he was made adjunct professor of zoölogy at the Lawrence School. But he continued to assist Agassiz until 1863. During the year 1864 he delivered a course of lectures at the Lowell Institute, and from 1866 to 1869 was professor of the natural sciences at the Pennsylvania Agricultural College. From 1869 to 1872 he held a similar post at the University of Kentucky, and during the last year of his life was professor of veterinary science at the Massachusetts Agricultural College, in Amherst. His book-form publications include an interesting volume entitled *Mind in Nature* (1865), constituting Clark's Lowell Institute lectures of 1864. Consult Packard, "Memoir of Henry James Clark," in *Biographical Memoirs of the National Academy of Sciences* (Washington, 1877).

CLARK, Sir James (1788-1870). An English physician. On the accession of Queen Victoria to the throne, he was appointed physician-in-ordinary to her Majesty, and in that capacity attended the Queen on most of her journeys to Scotland and the Continent. His publications include: *On the Sanative Influence of Climate* (1829), and *A Treatise on Pulmonary Consumption* (1835).

CLARK, John Bates (1847—). An American economist, born at Providence, R. I., January 26, 1847, and educated at Brown University, Amherst College, and at the universities of Heidelberg and Zurich. He was appointed professor of political economy and history in Carleton College, Minn., 1877; professor of history and political science in Smith College, 1881; professor of political economy in Amherst College, 1892; and in Columbia University, 1895. For three years (1892-94) he was lecturer on economics in the Johns Hopkins University, and (1893-95) was president of the American Economic Association. Besides numerous articles in scientific periodicals, he has published the following works: *The Philosophy of Wealth* (1886); *Wages* (1889); *Capital and Its Earnings* (1888); *The Distribution of Wealth* (1901). Since the death of Francis A. Walker, Professor Clark, on account of his profound and original contributions to the science of political economy, has occupied the first place among American economists. Consult Ely, "Decade of Economic Theory," in *Annals of the American Academy of Political and Social Science*, vol. xv. (Philadelphia, 1900).

CLARK, Jonas Gilman (1815-1900). An American philanthropist, born at Hubbardston, Mass. After a term of service as a carriage-maker's apprentice, he began the manufacture of tinware, with shops at Milford and Lowell. In 1853 he went to California, where he developed a successful business. He invested largely in real estate, and subsequently added to his fortune by banking operations in the East. In 1887 he obtained a charter for an institution of higher education, and in 1889 founded Clark University at Worcester, Mass., with an endowment fund of $1,000,000. The terms of his will secured to the university a further endowment of $2,500,000. (See Clark University.) He also established an endowed public library at Hubbardston.

CLARK, Lewis Gaylord (1810-73). An American editor, born in Otisco, N. Y. For twenty-five years (1834-59) he edited, in New York City, the *Knickerbocker Magazine*, which, by means of contributions from such writers as Irving, Bryant, Willis, and Longfellow, and by his own departments of the "Editor's Table" and "Gossip with Readers and Correspondents," he made the leading literary publication of the time in the United States. Pecuniary distress caused its discontinuance in 1859, and Clark removed to Piermont, N. Y., where he lived in a residence presented by former contributors to his magazine, who raised the necessary funds in part by publishing a volume of their contributions, under the title, *The Knickerbocker Gallery*. He held a place for some time in the New York Custom-House, but still contributed regularly to most of the leading periodicals. His only books are the *Knickerbocker Sketch-Book* (1850), and *Knick-Knacks from an Editor's Table* (1852). Consult Wendell, *A Literary History of America* (New York, 1900).

CLARK, Rev. T. The pseudonym of John Galt, a Scottish novelist (1779-1839).

CLARK, Thomas March (1812-1903). An American Episcopal prelate. He was born at Newburyport, Mass.; graduated at Yale in 1831; studied theology at Princeton, and was licensed to preach as a Presbyterian in 1835. He became an Episcopalian in the following year, and was rector of Grace Church, Boston, for seven years, afterwards holding charges in Philadelphia, Hartford, and Providence. In 1854 he was consecrated Bishop of Rhode Island, and in 1899, on the death of Bishop Williams, of Connecticut, became Presiding Bishop of the Episcopal Church in America. His *Reminiscences* appeared in 1895; among his other works are *Early Discipline and Culture* (1852), and *Primary Truths of Religion* (1869).

CLARK, William (1770-1838). An American soldier and explorer, the associate of Meriwether Lewis on the famous Lewis and Clark Expedition. He was born in Caroline County, Va.; removed with his family to the site of Louisville, Ky., in 1784; entered the army, and served as a lieutenant of infantry, under General Wayne, against the Indians, in 1791. He resigned, owing to ill health, in 1796; but in 1803 was recommissioned as a second lieutenant, and from 1804 to 1806 shared with Meriwether Lewis the command of an exploring party which, leaving Saint Louis in May, 1804, crossed the continent, reaching the mouth of the Columbia River in November, 1805, and arrived at Saint Louis on its return in September, 1806. (See Lewis and Clark Expedition, The.) Subsequently he was commissioned brigadier-general of militia, served as Indian agent for the Territory of Upper Louisiana, was Governor of Missouri Territory from 1813 to 1821, and acted as Superintendent of Indian Affairs at Saint Louis from 1822 until his death. Consult: The biographical sketch in Coues (editor), *History of the Expedition Under the Command of Lewis and Clark* (New York, 1893), and the authorities referred to under Lewis and Clark Expedition, The.

CLARK, William Andrews (1839—). An American capitalist and politician, born near Connellsville, Pa. He studied law at Mount Pleasant (Iowa) University, but never practiced; drove an ox-team to Montana in 1863, and by manufacturing, mercantile pursuits, mining, and banking, acquired a large fortune. It is said that he became the largest owner of copper-mines in the world. In 1884 and 1889 he was president of the Montana Constitutional Convention. He was Democratic nominee for United States Senator in 1890, but although he claimed the election, did not secure a seat. In 1899 he was elected by the State Legislature to succeed Lee Mantle as United States Senator. Thereupon, at the instance of Marcus Daly, the Anaconda mine-owner, and his political rival, there was begun, before the Senate Committee on Elections and Privileges, an investigation which resulted in the recommendation by the committee that the Senate adopt a resolution to the effect that Clark "was not duly and legally elected to a seat in the Senate." Clark, in an address to the Senate, reviewed the report of the committee, and submitted a copy of his resignation. Almost immediately thereafter he was appointed by the acting Governor of Montana to fill the vacancy caused by his resignation. This appointment was subsequently declared by the Governor to be invalid. Clark was elected to the United States Senate by the Montana Legislature for the term of 1901-07.

CLARK, William Bullock (1860—). An American geologist, born at Brattleboro, Vt. He received his education at Amherst, Mass., and studied geology at Munich. In 1887 he was made instructor in geology at Johns Hopkins University, and in 1888 became connected with the United States Geological Survey. In 1891 he was appointed director of the Maryland Weather Service; from 1892 to 1894 was associate professor of geology at Johns Hopkins University, and in the latter year was made full professor and placed at the head of the geological laboratory. In 1896 he was made State Geologist of Maryland. His publications include a number of interesting papers and reports dealing with subjects of American geology.

CLARK, William George (1821-78). An English scholar. He was born in March, 1821, and passed his boyhood in Yorkshire. In 1844 he graduated from Trinity College, Cambridge, with great distinction, and was elected fellow of his college. He was subsequently elected a tutor, and then public orator of the university (1867). In 1849 he visited Spain, and in 1856 he made a tour of Greece. Sketches of these travels were published under the titles *Gazpacho* (1850) and *Peloponnesus* (1858). In 1853 he took orders, publishing in 1860 *Four Sermons* preached at Trinity; but in 1869 he asked his Bishop to be relieved, stating his reasons for the step in a pamphlet entitled, *The Present Dangers of the Church of England* (1870). He edited the first series of *Cambridge Essays* (1855); contributed to *Fraser's Magazine;* and was one of the founders of the *Journal of Philology* (1868), of which he was an editor; but he is chiefly known for the *Cambridge Shakespeare* (9 vols., 1863-66), in which, though it was planned by himself, he was aided by W. A. Wright (q.v.). It furnishes the best text of any yet published. The two editors also prepared the *Globe Shakespeare* (1864), and single plays for students. Owing to ill health, Clark retired from Cambridge in 1873 and passed his last years at York, where he died, November 6, 1878. In 1883 the Clark Lectureship in English Literature was founded, at Trinity, from property he left to the college.

CLARK, Willis Gaylord (1810-41). An American poet, born at Otisco, N. Y. He became proprietor and editor of the *Philadelphia Gazette,* and was long a contributor to the *Knickerbocker Magazine,* edited by his brother, Lewis Gaylord Clark (q.v.), by whom were prepared his *Literary Remains* (1844) and a complete edition of his poems (1847). The former of these was made up chiefly of the *Ollapodiana Papers,* a series of prose sketches that had first appeared in the *Knickerbocker.* His poetry is contemplative and serious, his prose marked by humorous fancy. Consult: Wendell, *A Literary History of America* (New York, 1900).

CLARKE, Adam (c.1762-1832). A British Methodist clergyman and biblical scholar, born in County Londonderry, Ireland. He studied at John Wesley's School, at Kingswood, near Bristol; adopted the career of a Methodist preacher; was sent out by Wesley, in 1782, to preach the Methodist doctrines, and was president of the conferences of 1806, 1814, and 1822. He was a thorough student of the classics, natural science, Church history and Oriental languages and literature, and published works in all of these branches. Some of his books are: *A Bibliographical Dictionary* (6 vols., 1803-04); *Memoirs of the Wesley Family;* and, most important of all, *Commentary on the Bible* (8 vols., 1810-26). He was engaged in editing Rymer's *Fœdera,* from 1808 to 1818, when exhaustion compelled him to give up the task. For his *Life,* consult Etheridge (London, 1858).

CLARKE, Benjamin Franklin (1831—). An American engineer and educator, born at Newport, Maine. He graduated in 1863 at Brown University, and afterwards became connected with the university as instructor (1863-68), professor of mathematics (1868-93), professor of mechanical engineering (from 1893), and acting president (1896-97 and 1898-99). In 1884 he published a biography and eulogy of Prof. Samuel S. Greene.

CLARKE, Charles Cowden (1787-1877). An English author and lecturer, born in Enfield, Middlesex. He was an intimate friend of Shelley, Keats, Leigh Hunt, and Lamb. In conjunction with his wife, Mary Cowden Clarke (q.v.), he annotated an edition of Shakespeare (1869), and compiled *The Shakespeare Key* (1879). His brilliant lectures on Shakespeare and other poets, which he delivered in London (1834-54), gave him a considerable reputation, and did much to arouse a wider interest in the higher drama. He published: *Tales from Chaucer* (1833); *Shakespeare Characters* (1863); *Molière Characters* (1865); *Recollections of Writers* (1878): and numerous articles on the drama and fine arts for periodicals. Consult *Biography,* by his wife (London, 1887).

CLARKE, Edward Daniel (1769-1822). An English traveler and mineralogist. He was born at Willingdon, in Sussex; graduated at Cambridge in 1790; and then traveled, as companion to several wealthy young men, through the greater part of Europe, Egypt, and Asia Minor, remaining away from England until 1802. In 1807 he began a course of lectures on mineralogy at Cambridge, and the university established a professorship of that science for him. He presented to the library a number of valuable marbles; among others, the colossal statue of the Eleusinian Ceres, discovered by Wheeler in 1676, and now in the Fitzwilliam Museum. His *Travels* (6 vols., 1810-23) were received with extraordinary favor. Besides this work and numerous publications bearing on mineralogy, he wrote: *Greek Marbles Brought from the Shores of the Euxine, Archipelago, and Mediterranean* (1809), and *The Tomb of Alexander* (1805). His collection of minerals, coins, etc., was purchased by Cambridge University. For his *Life,* consult Otter (London, 1825).

CLARKE, Helen Archibald. An American editor and critic, born in Philadelphia. She graduated, in 1884, at the music department of the University of Pennsylvania; in 1889, with Charlotte Porter, founded *Poet-Lore,* a quarterly magazine of letters, and in addition to many articles for reviews has published, in collaboration with Charlotte Porter, editions of *Robert Browning's Poems* (1896); *Robert Browning's Complete Poetical Works* (1898); and *Browning Study Programmes* (1900).

CLARKE, Henri Jacques Guillaume, Comte d'Hunebourg and Duc de Feltre (1765-1818). A French general, born at Landrecies (Nord). He studied at the Ecole Militaire, Paris, entered the cavalry, and having become lieutenant-colonel, so distinguished himself at Horebheim as to earn promotion to the rank of brigadier-general. In 1793 he was deprived of his command, as a suspect, but in 1795 was reinstated in the service as a general of division, and made by Carnot chief of the topographical bureau of the War Ministry. Sent by the Directory to Italy to observe the movements of Napoleon, then commanding the French army there, he entered into the spirit of that general's plans, and was later rewarded by being appointed his private secretary. In 1805 he was Governor of Vienna, in 1806 of Berlin.

and in 1807 Minister of War. Upon the entry of the Allies into Paris, he declared himself a Royalist; during the Hundred Days accompanied Louis XVIII. into exile to Ghent, and from 1815 to 1817 was again Minister of War.

CLARKE, Jacob Augustus Lockhart (1817-80). An English physician, born in London. He was brought up in France, but studied medicine in England, at Guy's and Saint Thomas's hospitals. He there divided his attention between private medical practice and original research in microscopic anatomy and pathology, giving most of his time to research. A group of ganglion-cells in the spinal column was named, after him, 'the posterior vesicular column of Clarke.' The results of his investigations were published in the form of special papers; he wrote no books. A list of his papers may be found in the *Catalogue of the Library of the Medico-Chirurgical Society* (1879).

CLARKE, James Freeman (1810-88). An American Unitarian clergyman. He was born in Hanover, N. H., and graduated at Harvard in 1829, and at the Cambridge Divinity School in 1833. He was then called to become pastor of a Unitarian church in Louisville, Ky. In 1841 he assisted in founding the Church of the Disciples, Boston, of which he was pastor from 1841 to 1850, and from 1853 until his death. He was a friend of Emerson and Channing, a supporter of the anti-slavery movement, and secretary of the American Unitarian Association in 1859-62. He was also for many years one of the overseers of Harvard, where he was professor of natural religion and Christian doctrine (1867-71), and lecturer on ethnic religions (1876-77). Besides a vast number of articles contributed to current journals and magazines, Dr. Clarke published many works, including: *Theodore* (1841), a translation from the German of De Wette: *Campaign of 1812* (1848); *Eleven Weeks in Europe* (1852); *Christian Doctrine of Prayer* (1854, new ed. 1874); *The Hour Which Cometh and Now Is* (1864, 3d ed. 1877); *Orthodoxy: Its Truths and Errors* (8th ed., 1885); *Steps of Belief* (1870); *The Ten Great Religions* (2 vols., 1871-83; vol. i., 22d ed. 1886; vol. ii., 5th ed. 1886); *Common Sense in Religion* (1874); *Essentials and Non-Essentials in Religion* (1878); *Manual of Unitarian Belief* (1884); *Anti-Slavery Days* (1884); and *Vexed Questions* (1886).

CLARKE, John (1609-76). An English physician, one of the founders of Rhode Island, in America. He emigrated to Boston in 1637; was one of the friends of Ann Hutchinson there, and with her was driven out of the Colony. Roger Williams received him, and Clarke thus became one of the founders of Rhode Island. He founded at Newport, probably in 1638, a Baptist church, which, next to the one founded by Roger Williams at Providence in 1636, was the earliest in America. He went with Williams to England in 1651, as an agent for the Colony, and there published *Ill News from New England: or, a Narrative of New England Persecution.* After remaining for twelve years in England, he procured from Charles II. a second charter for Rhode Island, which secured to every person the right to follow his own judgment in matters of religion. On his return he resumed the care of the Newport church, and kept the pulpit until his death. He was also a member of the General Assembly from 1664 to 1669; was Deputy Governor in 1669 and 1671, and afterwards codified the Rhode Island laws. He has been called 'the Father of American Baptists.' Consult articles in the *Baptist Quarterly* (Philadelphia, 1876).

CLARKE, John Mason (1857—). An American geologist and paleontologist, born at Canandaigua, N. Y. He studied at Amherst and the University of Göttingen, and in 1881-84 was professor of geology and mineralogy at Smith College. In 1885 and 1886 he was lecturer on geology at the Massachusetts State Agricultural College, in Amherst. In 1894 he was appointed State Geologist of New York and professor of geology in the Rensselaer Polytechnic Institute at Troy, and in 1898 State Paleontologist of New York. His publications include: *New Devonian Crustacea* (1882); *Cirriped Crustacea from the Devonian* (1883); *Ueber deutsche oberdevonische Crustaceen* (1884); *On Devonian Spores* (1885); and *On the Higher Devonian Faunas of Ontario County, New York* (1886).

CLARKE, John Sleeper (1833-99). An American comedian, after 1867 a resident of England. He was born at Baltimore, and in his boyhood was a schoolmate of Edwin Booth, with whom he engaged in amateur dramatic readings. Giving up the study of law in order to go upon the stage, he made his first professional appearance in Boston, as Frank Hardy, in *Paul Pry*, at the Howard Athenæum, in 1851. The next year he went to Philadelphia. In 1859 he married Asia Booth, the sister of his old schoolmate. He made his appearance in New York, in 1861, as Diggory, in *The Spectre Bridegroom.* From 1864 to 1867 he was associated with Booth in the management of the Winter Garden, New York; they also had theatres in Philadelphia and Boston. Clarke's popularity was very great, among his favorite parts being Dromio of Syracuse, Paul Pry, Bob Brierly in the *Ticket-of-Leave Man*, and especially Major Wellington de Boots in *Everybody's Friend*, and Toodles. Having gone to London in 1867, he made his English début in the rôle of Major de Boots. His success was such that he decided to remain in England, though he afterwards made several visits to the United States (1870, 1871, 1879, and 1884), where he was warmly welcomed. Some of his later parts were Salem Scudder in *The Octoroon*, Dr. Pangloss in *The Heir at Law*, Ollapod in *The Poor Gentleman*, Babbington Jones in *Among the Breakers*, and Bob Acres in *The Rivals;* but Toodles remained the favorite. Its first run at the Strand Theatre, where Clarke was long engaged, was for two hundred nights. His later years were passed at leisure, near London. Consult: Bell, in Matthews and Hutton, *Actors and Actresses of Great Britain and the United States*, vol. ii. (New York, 1886); and Clapp and Edgett, *Players of the Present* (New York, 1899).

CLARKE, MacDonald (1798-1842). An American writer, known as 'The Mad Poet.' He was a native of Bath, Maine, but was for many years a conspicuous figure in New York City, where his amiable eccentricities endeared him to his contemporaries. He considered himself a great poet, and, besides a mass of trash, wrote some things that are tender and lovable. Among his conceits the best known is "Now Twilight lets her curtain down, and pins it with a star." Among his publications, most of which are now rare, are: *A Review of the Eve of Eternity* (1820); *The Elixir of Moonshine, by the Mad Poet* (1822); *The Belles of Broadway* (1833); *Death in Disguise*—a temperance poem (1833); and *A Cross and a Coronet* (1841).

CLARKE, Marcus. See Australian Literature.

CLARKE, Mary Victoria Cowden (1809-98). An English Shakespearean scholar and author. She was the pupil and associate of Mary Lamb. At the age of nineteen she was married to Charles Cowden Clarke, and soon afterwards began the great work of her life, the *Concordance to Shakespeare*, which was published in London in 1846. She afterwards published: *The Girlhood of Shakespeare's Heroines* (1850); *The Iron Cousin* (1854); *World-Noted Women* (1858); *The Shakespeare Key* (1879); *My Long Life: An Autobiography* (1896); and *Letters to an Enthusiast: Being a Series of Letters addressed to Robert Balmanno, Esq., of New York, 1850-61*, edited by A. U. Nettleton (Chicago, 1902).

CLARKE, Rebecca Sophia (1833—). An American author, born at Norridgewock, Maine. Under the pseudonym of 'Sophie May,' she published such juvenile books as the *Little Prudy Stories* (6 vols., 1864-65); *Dotty Dimple Stories* (6 vols., 1867-69); and others.

CLARKE, Samuel (1675-1729). An English clergyman, born at Norwich, and educated at Caius College, Cambridge. He was a disciple of Newton, and attempted to modify the theories of Descartes. In 1698 he became chaplain to Bishop Moore, of Norwich, and undertook the study of divinity, publishing in 1699 *Three Practical Essays on Baptism, Confirmation, and Repentance*. In 1704-05 Clarke delivered the Boyle Lectures, out of which was developed his *Demonstration of the Being and Attributes of God;* and after the death of Locke, in 1704, he was considered as at the head of English metaphysicians. Queen Anne made him one of her chaplains, and presented him to the rectory of Saint James, Westminster. In 1708 he published *A Discourse Concerning the Unalterable Obligations of Natural Religion and the Truth and Certainty of Christian Revelation*, and in 1712 *The Scripture Doctrine of the Trinity*, in which his denial of the belief of the primitive Church in the Trinity brought upon him the attacks of theologians. In 1714 the Lower House of Convocation complained of his teachings and sent the matter to the Upper House. Clarke evaded the difficulty, and promised to be silent on the subject of the Trinity. His views were considered to be semi-Arian (see Arius), and involved him not only with authorities of the Established Church, but with the freethinkers of his time. In 1715 appeared his *Philosophical Inquiry Concerning Human Liberty*. The Princess of Wales, afterwards Queen Caroline, requested him to discuss with Leibnitz the questions of time and space and their relations to God. The correspondence to which this gave rise is to be found in the collection of papers which passed between Clarke and Leibnitz (1717). Leibnitz claimed that time and space are confused perceptions; Clarke endows them with real existence, as a necessary consequence of the external existence of God. His works include an edition of Cæsar (1712); Homer's *Iliad*, in Greek and Latin (1729); *Exposition of the Church Catechism* (1729). His most important work was done in the sphere of ethics, where he maintained that morality is "incumbent on men, from the very nature and reason of things themselves." "The fitness of things" requires that every object be treated according to its own nature, and therefore that man be treated by man with due respect to his freedom of choice. The laws of morality are as reasonable as those of mathematics, and are independent of the consequences of moral acts; but God has so constituted the world that morality is finally rewarded. See his *Life*, by his friend Hoadly, prefixed to his collected works, published in 1738; and consult L. Stephen, *History of English Thought in the Eighteenth Century* (London, 1876).

CLARKE, William Horatio (1840—). An American organist and musical author. He was born at Newton, Mass.; held positions as organist at Norwood, Dedham, Boston, and Woburn, and subsequently removed to Dayton, Ohio, where he was appointed superintendent of public schools. From 1878 to 1887 he was organist at the Tremont Temple, Boston. After his retirement, he became established at Reading, Mass. Clarigold Hall, a well-known chapel of music in that city, with its excellent four-manual organ, was built by him. His *New Method for Reed-Organs* is justly celebrated. It acquired an extensive popularity, more than 100,000 copies of the work having been sold within the twenty years following its publication in 1869.

CLARKE, William Newton, D.D. (1841—). An American Baptist theologian. He was born at Cazenovia, N. Y., December 2, 1841; graduated at what is now Colgate University in 1861, and from Hamilton Theological Seminary in 1863. After serving as a pastor, he was professor in Toronto Baptist College from 1883 to 1887, and since 1890, of Christian theology in Colgate University, Hamilton, N. Y. He has published: *Commentary on the Gospel of Mark* (1881); *The Circle of Theology: An Introduction to Theological Study* (1897); *Outline of Christian Theology* (1897); *What Shall We Think of Christianity?* (1899); *Can I Believe in God the Father?* (1899); *A Study of Christian Missions* (1900).

CLARKE FORK. One of the most important forks of the Columbia River, formed by the junction of the Flathead and Missoula rivers, Montana (Map: Montana, A 1). It flows northwest, through Lake Pend d'Oreille, in Idaho, continuing in a northwest course thence across the northeast corner of Washington, empties into the Columbia River (q.v.) on the Canadian frontier. It has a total length of about 650 miles, from the source of either tributary, and possesses abundant water-power.

CLARKS'BURG. A city and the county-seat of Harrison County, W. Va., 100 miles southeast of Wheeling; on the Monongahela River, and on branches of the Baltimore and Ohio and other railroads (Map: West Virginia, D 2). It is in a country rich in coal, oil, and natural gas, and has manufactures of woolen goods, window-glass, decorated tableware, iron, and tinplate, and shaft-pulleys. The city contains two hospitals, and is the seat of the Broaddus Classical and Scientific Institute. It was the birthplace of 'Stonewall' Jackson. Settled in 1772, Clarksburg was incorporated in 1849, and is governed at present under a charter of 1897, which provides for a mayor, elected annually, and a city council chosen by wards. The water-works are owned and operated by the municipality. Population, in 1890, 3008; in 1900, 4050.

CLARK'SON, Matthew (1758-1825). An American soldier and philanthropist, born in New York City. At the outbreak of the Revolutionary War he enlisted as a private, and in 1777 took part in the Saratoga campaign. He afterwards served as aide-de-camp, with the rank of major, to Gen. Benedict Arnold (August, 1778, March, 1779), and to Gen. Benjamin Lincoln (March, 1779-July, 1782); was taken prisoner at Charleston, on May 12, 1780, and in 1783 was brevetted lieutenant-colonel. After the war he returned to New York, where he took an active interest in all public and philanthropic enterprises. He served several terms in the State Legislature, was president for many years of the bank of New York; was governor of the New York Hospital for thirty years, and did much for prison reform and the establishment of public schools. Consult *The Clarksons of New York* (New York, 1875-76).

CLARKSON, Thomas (1760-1846). An English philanthropist and anti-slavery agitator, born in Cambridge. He studied at Cambridge University, and early gave evidence of his antagonism to slavery in a Latin prize essay, which he wrote in 1785, on the question, "Is it right to make slaves of others against their will?" An English translation had an extensive circulation, and Clarkson resolved to devote his life to a crusade against African slavery. Associations were formed, and Clarkson, besides visiting the principal cities of England and going to Paris in the cause, published numerous essays, pamphlets, and reports on the subject. Wilberforce, whose coöperation he had secured, took the lead in the anti-slavery agitation, and in 1787 brought the subject before Parliament. On March 25, 1807, the bill for the suppression of the slave-trade became a law, and Clarkson subsequently wrote *A History of the Rise, Progress, and Accomplishment of the Abolition of the African Slave-Trade* (1808). On the formation of the Anti-Slavery Society, in 1823, for the abolition of slavery in the West Indies, Clarkson became one of its leading members. He saw the object of its efforts attained in 1833. His other works include: *Memoirs of the Private and Public Life of William Penn* (1813); *Thoughts on the Necessity of Improving the Condition of the Slaves in the British Colonies* (1823). Consult: Taylor, *Biographical Sketch of Thomas Clarkson* (1839), and Elmes, *Thomas Clarkson*, (1876).

CLARKS'VILLE. A city and the county-seat of Montgomery County, Tenn., 45 miles northwest of Nashville; near the junction of the Cumberland and Red rivers, and on the Louisville and Nashville Railroad (Map: Tennessee, D 4). It is one of the great tobacco-markets of the South, and has manufactures of iron, agricultural implements, lumber, flour, etc., and valuable iron-ore deposits in the vicinity. It is the seat of the Southwestern Presbyterian University, founded in 1875, and of a Methodist seminary for young ladies. Settled in 1780, Clarksville was incorporated some five years later, and is at present governed under a charter of 1850, revised in 1891. The mayor is elected every two years, and the city council controls all appointments to municipal offices. The city owns and operates its water-works. Population, in 1880, 3880; in 1890, 7924; in 1900, 9431.

CLARKSVILLE. A city and the county-seat of Red River County, Tex., 61 miles west by north of Texarkana; on the Texas and Pacific Railroad (Map: Texas, G 3). The centre of a fertile agricultural region, it carries on a large trade in cotton, live stock, grain, and hides. The industrial establishments include a cotton-compress, cottonseed-oil mill, etc. Population, in 1890, 1588; in 1900, 2069.

CLARK UNIVERSITY. An institution of higher education, founded in 1887, at Worcester, Mass., by Jonas Gilman Clark (q.v.). The university was planned to afford opportunity for full and free research along advanced lines; to add as materially as might be to the ascertained truths of science; and to equip educators and specialists of the highest qualifications. It was especially stipulated that the best academic standards should forever be maintained, and as the original endowment was insufficient to equip courses in all subjects, but few courses were at first equipped, and those completely. These comprised post-graduate courses in the fundamental sciences of physics, chemistry, biology, psychology, and education. Only accredited college graduates are admitted as candidates for the Ph.D. degree; and students are thrown largely upon their own resources, the instructors acting, so far as possible, as 'guides' and counselors. Not many, but the best students, men or women, are sought; and to aid these, ten scholarships and twenty fellowships have been established, ranging in value from $100 to $600. Instruction is intrusted in some degree to the fellows, and also to the docents (see Docent), the latter representing the highest academic university appointments. The library, collected for the specialized requirements of each department, numbers some 20,000 volumes and 1500 pamphlets. Upon the death of Mr. Clark in 1900, the university received a bequest of $2,500,000 for the establishment of an undergraduate department, to be conducted upon the same general plan, so far as feasible, as that of the post-graduate department. This collegiate department was organized in 1902 with Carroll Davidson Wright (q.v.), United States Commissioner of Labor, as president. To what extent Clark University has contributed to the higher education of the country may be judged from the fact that within ten years from its foundation its students and graduates published not less than 500 works, memoirs, and monographs. Three journals, furthermore, are regularly published by the university; these are the *American Journal of Psychology*, the *Pædagogical Seminary*, and the *Mathematical Review*. The president of the university since its inception, and to whom its development must in large measure be ascribed, is Granville Stanley Hall (q.v.), formerly professor of psychology in Johns Hopkins University. Consult *Clark University, 1889-99, Decennial Celebration* (Worcester, 1899).

CLASEN, klä′zen, Lorenzo (1812-99). A German artist and art critic, born in Düsseldorf. He painted several historical pictures, including "Poetic Contest on the Wartburg," and "The Watch on the Rhine." But he is better known for his art criticisms in periodicals, for his editorship of Faber's *Konversations-Lexikon für bildende Kunst*, and for his publications, *Des Kunstfreundes Reiseabenteuer* (1847), and *Erlebtes und Verwebtes* (1886).

CLASSICS (Lat. *classicus*, from *classis*, class, from *calare*, Gk. καλεῖν, *kalein*, to call). The term *classici* was originally applied to those citizens of Rome that belonged to the first and most influential of the six classes into which Servius Tullius divided the population. As early as the second century A.D., it is applied figuratively by Gellius to writers of the highest rank; and this mode of designation has since been very generally adopted, in both literature and art. Most nations have had, at some one time, a more than usual outburst of literature; this they usually style the classical period of their literature, and its most distinguished writers their classics. But as the great productions of the writers and artists of antiquity have continued to be looked upon by moderns as models of perfection, the word 'classic' has come to designate, in a narrower sense, the best writers of Greece and Rome, and 'classical' to mean much the same as 'ancient.'

CLASSIFICATION OF ANIMALS. Classification is the act of sorting out and putting into groups kindred ideas, observations, or objects. As many classifications, then, are possible as are the categories which different persons may erect; for no two persons see things in the same light, nor have the same thoughts. Besides, there are many aspects that the one observer may take in viewing the same thing. Thus, we may classify plants and animals according to their anatomical structure, the method of their embryological development, their food or habitats. All classifications, then, are arbitrary; are the attempts of man to arrange, in an orderly fashion, his conceptions and observations. Classification in biology is, consequently, to be regarded as a subjective process. Nevertheless, the constant attempt of all modern naturalists is to conform, in the formation of their groups, as closely as possible to the facts of nature, and thereby express the natural kinship or blood-relationship of animals, as learned through the investigation of their structure and phylogeny. A natural and true classification, then, is a statement of near or remote relationships, according to the degree of differentiation the forms sought to be classified have undergone in their descent from a more or less remote common ancestor. If a complete classification of animals is ever made, it will be a complete genealogy of the animal kingdom. In this sense, classification is neither arbitrary nor artificial, but only tentative; and it will be permanent in so far as it conforms to the facts of kinship in descent. Hence, a nearer and nearer approach to a natural and real classification has been made with each forward step of knowledge in embryology, morphology, and paleontology.

"There is no question in natural history," said Louis Agassiz, in his classic *Essay on Classification*, "on which more diversified opinions are entertained than on that of classification—not that naturalists disagree as to the necessity of some sort of arrangement in describing animals or plants, for since nature has become the object of special studies, it has been the universal aim of all naturalists to arrange the objects of their investigations in the most natural order possible. Even Buffon, who began the publication of his great Natural History by denying the existence in nature of anything like a system, closed his work by grouping the birds according to certain general features exhibited in common by many of them. It is true, authors have differed in their estimation of the characters on which their different arrangements are founded; and it is equally true that they have not viewed their arrangements in the same light, some having plainly acknowledged the artificial character of their systems, while others have urged theirs as the true expression of the natural relations which exist between the objects themselves."

By collaboration and by common consent, certain categories have been agreed upon; and these we generally have in mind when we speak of the classification of the animal or vegetable kingdom. These categories are founded mainly on anatomical and embryological relationships and differences; and in zoölogical classification, for example, animals that resemble one another in structure, development, or both, are grouped closely together, or are more distantly associated, according to the nearness or remoteness of the kinship as evidenced by the facts of structure or development, whether in existing or in

Individual	Race	Species	Genus	Family	Order	Class
House Cat	Manx Angora Tabby Tortoise-shell	*domestica*	*Felis*	*Felidæ*	*Carnivora*	*Mammalia*
		lion tiger leopard	lynxes hunting-cats	dogs hyenas bears	whales bats apes, etc.	

extinct forms. These grades or degrees of kinship we speak of as species, genera, families, orders, classes, etc. Species are more nearly related than genera, genera than families, etc.

The total number of the kinds of animals, or species, that are recognized is not far from 400,000. In order to think of them all, it is necessary that they should be grouped into categories of larger size than species, and these, in turn, into still larger ones. This is rendered possible by the fact that animals show nearer and remoter affinities. The ordinary lowest category is *species;* but this may be subdivided into *races* or varieties; several similar species are grouped into a *genus;* related genera constitute a *family;* several families may make up an *order*. Orders constitute a *class;* classes a *phylum*. For example see table preceding.

A particular species receives a composite name, embracing first that of the genus, and, second, that of the species; thus, the common cat is *Felis domestica*.

Scientific Nomenclature.—The custom, above stated, of giving to each animal a double name, that of its genus and its species, arose with Linnæus, and is called 'binomial nomenclature.' It answers to a man's family and individual or 'Christian' name, as Smith, John. It always consists of Greek or Latin words, or of words put into Latinized form, partly because of a traditional custom descended from the early authors, who wrote only in Latin, but mainly because it is thus made comprehensible to readers in all languages. Furthermore, great confusion would follow the attempted use of vernacular names alone, since many different animals are given the same name in popular speech, while the same animal is known by various names in different localities. 'Robin' means several very diverse birds to persons living in America, Great Britain, India, or Australia, but *Turdus migratorius* is unmistakably the American thrush, locally called the robin. Theoretically, these names are supposed to be suitably applied. Thus, *turdus* is the old Latin term for a thrush-like bird, and *migratorius*, the Latin adjective 'migratory.' It often happens, however, through the misapprehension or ignorance of the person who first applies the name, that unsuitable or positively erroneous appellations have been given, or wrong collocations have been made. A subsequent student, discovering this error, or taking a different view of the animal's relationship, endeavors to correct it by giving it a new, and, in his opinion, better name; or he may transfer it to another genus but retain the specific name. A third writer, not knowing that the same animal has been previously described and named, may name it something entirely different. These changes and duplications went on almost unchecked until the middle of the nineteenth century, when the British Association for the Advancement of Science and other influential bodies of naturalists devised means of regulating the matter, which resulted in certain now generally accepted rules, the substance of which is as follows: A name for a new species is not recognized in science, unless it is in the customary binomial form (the two parts agreeing in number and gender), and has been accompanied by a description by which the animal may be satisfactorily identified, and which is published in some book or periodical accessible to students in general; and when this has been done, no other person may give the animal a different *specific* name. This is called the rule of priority—that is, the first name legally applied must remain (as a mere label), whether it is subsequently found to have been well chosen or not. A limit, however, was found necessary to this rule, and it is therefore agreed that no name previous to the one made or sanctioned by Linnæus in the tenth edition of his *Systema Naturæ* (1758) shall be recognized. Certain minor limitations are also made for local needs—as, for example, with reference to Rafinesque in the United States. In zoölogical or botanical nomenclature, a generic name can be applied only to one group of organisms. If it is subsequently given to something else the new application will not hold. According to one code, at least, a generic name that has disappeared by fusion of genera or the splitting of a genus cannot be used again. In scientific works, the technical name of an animal is often followed by the name (usually abbreviated) of the man who named it as a whole, as *Turdus migratorius*, Linn.; but if the generic name was made by one man and the specific by another, both authorities may be given, in order to avoid any mistake, thus: Bluebird, *Sialia sialis* (Linn.), Haldemann. Latterly, the recognition of subdivisions within species, called subspecies, races, or varieties, has led to the addition of a third name in many cases, especially among birds—for example, *Falco peregrinus anatum* means the (American) variety *anatum* of the European peregrine falcon, or our duck-hawk. Another custom is that all specific and varietal names shall begin with a small letter, even when 'proper' adjectives or nouns. Similar rules and explanations apply to the names of the higher groups, which are capitalized, always in the plural, and, in the case of the family, take the termination *idæ*, which in zoölogy invariably indicates a group of family rank. (*Note.*—In the present work the rule of technical books is not followed as to the initial of specific names, which are capitalized as they would be in English.)

CATEGORIES OF CLASSIFICATION. The number of known species of living animals is perhaps 350,000, to which must be added over 50,000 fossil described species, making over 400,000 in all. To contain all these forms it is necessary to provide a complicated system of categories of varying ranks. We recognize the fact that, in beast as well as in man, no two individuals are exactly alike. But just as the various members of the B. Smith family more nearly resemble each other than they do the Jones or Brown families, so certain other animals, while showing slight individual differences, possess so many common, constant qualities that we put them in the same species. Likewise, several species have certain qualities in common, while they differ in other respects so markedly from all other species that we class them together in one genus. In the same way, a number of related genera fall naturally into the same family.

Species.—A term applied in biology to the unit of classification—that is, the lowest group that receives a name. (For the exceptional usage in respect to 'varieties,' see below.) Although the term 'species' is almost universally employed by biologists to-day, a precise definition cannot be applied to it; for there is absolutely no criterion by which a species may be distinguished from a variety, on the one hand, or a genus on the other. Whether a lot of organisms under consideration showing certain differences shall be considered two varieties, two species, or two genera, depends upon the personal characteristics of the classifier. If he be conservative, and has studied extensively the systems of the past, he will draw his ideals from them, and call those groups 'species' which show about that difference accorded to other related species by equally conservative classifiers in the past. If he be radical, he will disregard the ideals of his predecessors, and, according to his personal bent, 'lump' the diverse forms into one species, or possibly into one variety, or 'split' them into distinct species. Indeed, a radical may take occasion to 'revise' the grouping of a conservative in accordance with his peculiar ideals—in consequence of which, numbers of species may disappear by inclusion into old ones, or new ones may be added by division of old ones; or, finally, the grouping may be thoroughly reorganized or disarranged. At the present time naturalists have hit upon no method of avoiding this intolerable condition of affairs, which is rapidly bringing chaos into what was supposed to be a 'system.' A century ago, before so extensive collections had been made and studies were so critical, it was generally believed that 'species' were perfectly distinct as well as immutable things. Even many of the scientific workers regarded the mythology of the first chapters of Genesis as a scientific record, and admitted that there were only so many 'species' as were created in the beginning; that each species received its name from Adam, and that one pair of each (except parthenogenetic species) was preserved in the Ark, to become the progenitors (or progenitor) of all the members of the species which have existed since. The worthlessness, for scientific purposes, of this literary account of the creation appears when we try to enumerate the 'species' that were thus created. We then realize that 'species' are not natural phenomena, but human devices of convenience, like the ward-boundaries of a city. The boundary lines between species may, in some cases, be in part determined by natural phenomena, as ward-boundaries may be limited by a stream or a bluff.

The history of the ideas entertained concerning species is an epitome of the most profound biological thought. In the development of any large idea, three stages may be recognized—first, the speculative suggestion of it; second, the clear statement of it as a working hypothesis; and, third, the demonstration. Such has been the history of the development of the modern idea of species as part of a continuous stream of life. The early Greeks were not troubled with the idea of species; they sought only a satisfactory speculative account of the origin of organisms. The early Christians interpreted the 'Mosaic' account of the creation liberally, regarding the creation not so much as the forming of completed organisms as the forming of the *seed* out of which they were to arise. During the Middle Ages, however, and especially from the middle of the sixteenth to the middle of the nineteenth century, the doctrine of 'special creation' was universally taught by the Church. Milton's epics popularized the idea of creation ready made, with adult animals of the different species; and the rigid conceptions of species which the early botanists and zoölogists had invented seemed to support the teachings of the churchmen. With the founding of universities in the twelfth and thirteenth centuries, science began to awaken, and one of the first products of the Renaissance was the natural philosophers. Such men as Francis Bacon, Descartes, Leibnitz, and Spinoza did not limit their ideas to the teachings of the Church; they taught the necessary principle of continuity, to which the natural development of 'species' was a necessary corollary. The more speculative naturalists, or philosopher-naturalists, next applied the doctrine of continuity, as an hypothesis, to the facts of organisms. Such were Bonnet, who recognized that all life was continuous, and Oken, who conceived that all organisms have developed out of a primitive slime. Finally came the great naturalists, putting forth the idea of the mutation of species tentatively at first, then with greater vigor, until Darwin came, at the fullness of time, to precipitate the revolution. See EVOLUTION; DARWIN; LAMARCK.

The view that species are wholly arbitrary groups is not accepted by all naturalists. De Vries especially lays stress on the point that species are objective. Every species, he believes, is made up of a number of specific characters, each of which depends upon a certain chemical particle or aggregation of molecules, which perpetuates itself and multiplies by self-division. So long as the descendant chemical particles remain like the parental ones, so long the species persists. These particles may, however, suddenly change through some cause, not precisely known, but probably environmental; and with a change in one of these particles goes a change in the adult specific quality that it controls, and also of the 'correlated' qualities. The consequence is that a form with many new qualities suddenly arises, and this form we may call a new species. De Vries has studied (*Die Mutationstheorie*, 1901) variable species in the field—for example, the evening primrose—and finds that new forms, clearly marked off from the original, typical ones, are constantly arising. They are, from the beginning, distinct and fully formed species. There are, however, other theories to account for that 'distinctness' or isolation which is not infrequently found. One is that species originated in isolated situations.

A group of land animals, getting by accident upon an island and varying normally, will in time come to be quite dissimilar from the forms on the mainland, because, being isolated, any peculiarities that may crop out among them will not be swamped by intercrossing with the main mass of the species. Thus, we find in the Galapagos Islands that each island has a peculiar species of lizard of a particular genus, and only one species occurs on each island. The same is true of certain sparrows on these islands. Even on islands nearer the mainland, like Nantucket or Fire Island, on the south side of Long Island, there are peculiar forms—incipient species. It is the isolation which has permitted them to arise; even a less degree of isolation may permit a difference to grow up. Thus, Darwin tells this story: "The two flocks of Leicester sheep kept by Mr. Buckley and Mr. Burgess have been purely bred from the original stock of Mr. Bakewell for upward of fifty years. There is not a suspicion existing in the mind of any one at all acquainted with the subject that the owner of either of them has deviated in any one instance from the pure blood of Mr. Bakewell's flock; and yet the difference between the sheep possessed by these two gentlemen is so great that they have the appearance of being quite different varieties." Darwin's explanation of the lack of intergrades between many species differs from the foregoing, and depends on the assumption that, of the descendants of any species, those that are most unlike are most apt to survive; so that where the number of forms (varieties) is very great, the intermediate ones (the intergrades) are pushed to the wall and are extinguished. In Darwin's words: "As in each fully stocked country natural selection necessarily acts by the selected form having some advantage in the struggle for life over other forms, there will be a constant tendency in the improved descendants of any one species to supplant and exterminate, in each stage of descent, their predecessors and their original progenitor. For it should be remembered that the competition will generally be most severe between those forms which are most nearly related to each other in habits, constitution, and structure. Hence all the intermediate forms between the earlier and later states—that is, between the less and more improved states of the same species—as well as the original parent species itself, will generally tend to become extinct. So it probably will be with many whole collateral lines of descent, which will be conquered by later and improved lines." This striking passage of Darwin deserves an experimental or statistical test. Until that is had, it can only stand as an excellent illustration of Darwin's logical treatment of special difficulties in his theory.

Another important attribute of a species is that its members are frequently sterile, with even closely related species. It would, however, be a mistake to assume that, on the one hand, all species, or even the hybrid offspring of crossed species, are always sterile. It is likewise an error to suppose that, on the other hand, sterility is confined to crosses between species. Breeders of animals are accustomed to find a considerable percentage of sterility between members of the same species; and when the members are close blood-relations, the percentage becomes very high. Nevertheless, the sterility of hybrids (crosses between species) is so common that Cuvier gave it as the sure criterion of species. For further facts and explanations of this question, see HYBRIDITY.

Finally, species are adapted to the conditions in which they live. By many this characteristic is considered a fundamental one; so that, when we have explained how their adaptations arise, we have explained how the species arose. It may be worth while, here, to state that there is a lack of unanimity in respect to the adaptive nature of all specific characters. Those who assert such adaptation insist that it cannot be denied that any given apparently useless organ may not be useful, or may not have been useful in some period of the animal's life, or that of its ancestors. See EVOLUTION; NATURAL SELECTION; and similar titles, and the books mentioned thereunder.

Variety, in natural history, is the designation of a group subordinate to species, distinguished from a race chiefly by the circumstance that a race is artificial. Varieties are regarded as the first step in the formation of species. They are not to be confused with variations, since, like species, they are groups of similar individuals. The question of when to call two differing lots of animals species and when varieties is not capable of satisfactory solution, except by erecting an artificial and arbitrary bar separating them. In the absence of any such arbitrary rule, we find some naturalists 'splitting' one species into many, by elevating the varieties to specific rank; while another naturalist will 'lump' several species, reducing them to the rank of varieties of one species. Many authors would define varieties to be founded on differences due to environment—differences that will disappear with changing environment. Those who are radical in recognizing by name minute and transitory differences of this kind confess that they cannot recognize with certainty their own varieties, unless they know the habitat of the specimen. Other authors regard the difference between variety and species to be solely one of degree of divergence in characters. As varieties became recognized, the custom was formed of adding a varietal name to the specific name, as has already been explained.

Genus.—A category having a rank between species and family, and consisting of a group of species deemed to be more closely related to each other than to anything else. There is absolutely no criterion by which we can distinguish between a genus and a species, on the one hand, and a family on the other; but it is often a fact that, when a collection of related species is arranged in an orderly fashion, more or less sharp breaks occur, which enable naturalists to draw lines. Consequently, the boundaries of genera are being constantly widened or restricted; and generic names change and disappear as a result of fusion of genera or of splitting up of a genus. Since the genus is that under which species are usually indexed, this instability of generic names is highly regrettable. What is needed is a recognition of the subjectiveness of generic names and of the prime necessity of the stability of nomenclature; no changes in generic names should be made without the best of reasons. The name of the genus (always written with a capital initial) is combined with that of the species. The name of the cat genus, for example, is *Felis;* and Felis leo, Felis tigris, Felis catus are the names of the lion, tiger, and wildcat species. These cats are more alike to one another than any one of them is to the dogs. The latter belong to the genus Canis. The size of a genus varies with the number of species it contains; some genera containing a hundred species or more, while others contain only one. Darwin believed that the species of a large genus are more variable than those of a small one. In any case, the species within a genus are not regarded as having diverged very widely from their common stock, and the criteria for generic distinctions are largely superficial characteristics.

Family.—A group of genera having a certain resemblance to one another, which indicates common descent, or 'family connection.' Features of structure more or less external, and belonging to parts, as limbs, wings, teeth, horns, etc., characteristic of methods of life, are of the kind of characters used in judging of family limits. Thus, the prime family distinction of the cats (Felidæ) is the arrangement for retracting the claws, which sharply defines them as a group from the dogs, on one hand, and the civets on the other; but the cheeta is able to retract its claws only partly, and this fact, in connection with other distinctive features, causes the animal to be placed in a genus separate from Felis.

Order.—Several related families may fall together, by the possession in common of characters denied to others, into a larger category known as an order. A familiar example is the order Carnivora, embracing the families of cats, dogs, civets, weasels, bears, etc., because all these exhibit an organization developed along lines of differentiation from other mammals, tending to fit them to prey upon other animals and digest a flesh diet. The various lines and degrees of specialization are recognized by subordinate groupings in families and genera.

Class.—Groups of orders are found to agree in certain very general and fundamental characteristics of organization, such as having six legs or eight legs; the production, by the skin, of hair, feathers, or scales; the integument being leathery or calcareous—and so on; and such groups form the next larger category, called a class. Even here, however, there is large room for difference of opinion as to limits; and, in some classes, an intermediate category called subclass seems necessary, as in the case of the prime division of the class Mammalia into monodelphic and didelphic, or of the class Cephalopoda into dibranchiate and tetrabranchiate. The same difficulty has led to naming groups of intermediate rank elsewhere—such as superfamilies, subfamilies, subgenera, etc.

Phyla.—Classes combine into several grand divisions of the animal kingdom, called subkingdoms, or phyla, by having in common a single or a few characteristics so broad and ancestral that they are spoken of as 'plan of structure.' Thus, all the mammals, birds, reptiles, amphibians, and fishes, together with several lowly representatives, such as the ascidians, are united by a single characteristic of structure possessed by no other animals—the presence of a backbone, or its essential equivalent, the notochord. This character is so wide-reaching and fundamental that it springs from the very root of the phylogenetic tree, and is of prime importance. By similar broad and fundamental 'plans of structure' are the other phyla of the twelve now recognized by most zoölogists characterized. Their origin is lost to view in the mists of primeval time, but even here two divisions may be recognized—the Protozoa and the Metazoa—the former embracing the single phylum Protozoa, or one-celled animals; the latter, all the rest which agree in consisting of many cells, having a two-layered embryonic development.

Historical Sketch of Classification. The Greeks had considerable knowledge concerning animals, which Aristotle recorded, added to, and arranged, for the first time of which we have any knowledge, in an orderly fashion. Aristotle had some conception of genera and species. It is true that his γένος (*genos*) was a rather elastic term, since it was applied both to small and large groups of animals. Aristotle also conceived a difference between vertebrates and invertebrates, although he made the distinction by means of an erroneous definition. The following are the eight groups of animals as defined by Aristotle:

Animals with Blood—Vertebrates:

(1) Viviparous animals (four-footed), and in a special γένος (*genos*) of this the whale was placed. (2) Birds. (3) Oviparous, four-footed animals. (4) Fishes.

Animals without (red) Blood—Invertebrates:

(5) Soft animals (μαλάκια, *malakia*, i.e. Cephalopoda). (6) Animals with soft shells (μαλακόστρακα, *malakostraka*, i.e. Crustacea). (7) Insects. (8) Shelled animals (sea-urchins, snails, mussels).

The elder Pliny added little to our knowledge of animals. He was simply a compiler, who copied freely from Aristotle, whom he sometimes misunderstood, and he admitted much of the error and superstition of his time to rank with fact. It was not until the seventeenth century that any very great addition to our knowledge of the structure, development, and relations of animals was made.

Linnæus to Cuvier.—Ray wrote a *Synopsis of Mammalia and Reptilia* (London, 1693), which was used by the master systematizer, Linnæus (1707-78), in his *Systema Naturæ*, as the foundation upon which he built that part of his classification that had to do with vertebrates. Linnæus did not add much to our knowledge as an investigator; but he sifted and sorted, rejected and retained, from the accumulations of his predecessors, and out of this more or less chaotic mass he erected his orderly system—the first great classification of animals. His *Systema Naturæ* went through thirteen editions, twelve of which were published during his lifetime, and five of these were revisions by his own hands. The arrangement by Linnæus was into 'classes,' as follows: (1) Mammalia. (2) Aves. (3) Amphibia (including reptiles). (4) Pisces. (5) Insects (including insects proper, myriapods, arachnids, and crustaceans). (6) Vermes (radiates, mollusks, worms, cirripeds, and a fish, myxine).

This classification was based mainly on external appearance and some internal anatomy; and, though imperfect and incomplete, it gave a great impulse to the study of zoölogy and to more orderly arrangements of animals, based on anatomical characters. It was Linnæus who introduced binary nomenclature, since he first gave every animal a generic and a specific name of Latin origin.

The next great systematist was Cuvier (1769-1832). "Cuvier did not," says Claus, "as most zoötomists have done, look upon anatomical discoveries and facts as in themselves the aim of his researches; but he contemplated them from a comparative point of view, which led him to the establishment of general principles." Moreover, Cuvier appreciated fully the idea of 'correlation.' "The organism," he declared, "consists of a single and complete whole, in which single parts cannot be changed without causing changes in all the other parts." Cuvier became convinced, from a study of the nervous system and the arrangement of the systems of organs, that the animal kingdom is divided into four great branches (*Tableau élémentaire de l'histoire naturelle des animaux*, Paris, 1798) as follows:

Branch 1. *Animalia Vertebrata.* Classes: (1) Mammalia. (2) Aves. (3) Reptilia. (4) Pisces.

Branch 2. *Animalia Mollusca.* Classes: (1) Cephalopoda (not subdivided). (2) Pteropoda (not subdivided). (3) Gastropoda. (Orders: Pulmonata, Nudibranchia, Inferobranchia, Tectibranchia, Heteropoda, Pectinibranchia, Tubulibranchia, Scutibranchia, Cyclobranchia.) (4) Acephala. (Orders: Testacea, Tunicata.) (5) Brachiopoda (no subdivisions). (6) Cirrhopoda.

Branch 3. *Animalia Articulata.* Classes: (1) Annelides. (Orders: Tubicolæ, Dorsibranchiæ, Abranchiæ.) (2) Crustacea. (Section 1: Malacostraca. Orders: Decapoda, Stomatopoda, Amphipoda, Læmodipoda, Isopoda. Section 2: Entomostraca. Orders: Brachiopoda, Pœcilopoda, Trilobitæ.) (3) Arachnides. (Orders: Pulmonariæ, Tracheariæ.) (4) Insects. (Orders: Myriapoda, Thysanura, Parasita, Suctoria, Coleoptera, Orthoptera, Hemiptera, Neuroptera, Hymenoptera, Rhipiptera, Diptera.)

Branch 4. *Animalia Radiata.* Classes: (1) Echinoderms. (Orders: Pedicellata, Apoda.) (2) Intestinal Worms. (Orders: Nematoidea, Parenchymatosa.) (3) Acalephæ. (Orders: Simplices, Hydrostaticæ.) (4) Polypi (Anthozoa, Hydroida, Bryozoa, Corallinæ, Spongiæ). (Orders: Carnosi, Gelatinosi, Polypiarii.) (5) Infusoria. (Orders: Rotifera, Homogenea.)

Lamarck to Leuckart.—Probably to Lamarck, more than to any other systematist, we are indebted for the term Invertebrata and to the arrangement of groups in an ascending series. In his *Histoire naturelle des animaux sans vertèbres* (Paris, 1801), he classifies the invertebrates as follows (accepting the vertebrates as arranged by Cuvier):

I. *Apathetic Animals.* Do not feel; no brain, no senses; rarely articulated.

Class 1. Infusoria. Orders: Nuda, Appendiculata.

Class 2. Polypi. Orders: Ciliata (Rotifera), Denudati (hydroids), Vaginati (Anthozoa and Bryozoa), and Natantes (crinoids and some halcyonoids).

Class 3. Radiaria. Orders: Mollia (Acalephæ), echinoderms (including Holothuriæ and Actiniæ).

Class 4. Tunicata. Orders: Botryllaria (compound ascidians), Ascidia (simple ascidians).

Class 5. Vermes. Orders: Molles and Rigiduli (intestinal worms and gordius), Hispiduli (Nais), Epizoariæ (epizoa and lernæans).

II. *Sensitive Animals.*

Class 6. Insects (hexapods). Orders: Aptera, Diptera, Hemiptera, Lepidoptera, Hymenoptera, Neuroptera, Orthoptera, Coleoptera.

Class 7. Arachnids. Orders: Antennatotracheales (Thysanura and Myriapoda), Exantennatotracheales and Exantennato-brancheales (Arachnida proper).

Class 8. Crustacea. Orders: Heterobranchia (Branchiopoda, Isopoda, Amphipoda, Stomapoda) and Homobranchia (Decapoda).

Class 9. Annelids. Orders: Apoda, Antennata, Sedentaria.

Class 10. Cirripeds. Orders: Sessilia and Pedunculata.

Class 11. Conchifera. Orders: Dimyaria, Monomyaria.

Class 12. Mollusks. Orders: Pteropoda, Gastropoda, Trachelipoda, Cephalopoda, Heteropoda.

Siebold and Stannius (1845) also divided the animal kingdom into vertebrates and invertebrates: and among the invertebrates the Protozoa were recognized as a separate type, and Vermes came to have very much the significance that it has in our modern classifications.

The classification of Leuckart is interesting, because it comes near to our present conceptions of the relationship of animals, and because of the fact that its author was a great teacher of zoölogy: and, hence, his classification has had great influence in education. Leuckart, *Die Morphologie und die Verwandtschaftsverhältnisse der wirbellosen Thiere* (Brunswick, 1848), divides animals above Protozoa (to which he paid no attention) into six 'types,' as follows:

Type I. *Cœlenterata.*

Class 1. Polypi. (Orders: Anthozoa and Cylicozoa.)

Class 2. Acalephæ. (Orders: Discophoræ and Ctenophoræ.)

Type II. *Echinodermata.*

Class 3. Pelmatozoa. (Orders: Cystidea and Crinoidea.)

Class 4. Actinozoa. (Orders: Echinida and Asterida.)

Class 5. Scytodermata. (Orders: Holothuriæ and Sipunculida.)

Type III. *Vermes.*

Class 6. Anenterati. (Orders: Cestodes and Acanthocephali.)

Class 7. Apodes. (Orders: Nemertini, Turbellarii, Trematodes, and Hirudinei.)

Class 8. Ciliati. (Orders: Bryozoa and Rotiferi.)

Class 9. Annelides. (Orders: Nematodes, Lumbricini, and Branchiati.)

Type IV. *Arthropoda.*

Class 10. Crustacea. (Orders: Entomostraca and Malacostraca.)

Class 11. Insecta. (Orders: Myriapoda, Arachnida, and Hexapoda.)

Type V. *Mollusca.*

Class 12. Tunicata. (Orders: Ascidiæ and Salpæ.)

Class 13. Acephala. (Orders: Lamellibranchiata and Brachiopoda.)

Class 14. Gastropoda. (Orders: Heterobranchiata, Dermatobranchia, Heteropoda, Ctenobranchia, Pulmonata, and Cyclobranchia.)

Class 15. Cephalopoda.

Type VI. *Vertebrata* (according to Cuvier).

Oken, Von Baer, and Agassiz.—The foregoing and certain other classifications had been developed in England, France, and Germany, under the guidance of anatomy; but, in many of them, the idea of the complexity of structure of animals seemed to outweigh the idea of unity of structure. During the early part of the nineteenth century another school developed in Germany, under the leadership of Schelling—the School of Natural Philosophy—which has extended its influence to all the physical sciences. Of its doctrines such men as Geoffroy Saint Hilaire in France, and Goethe and Oken in Germany, became expounders, and taught that unity prevailed everywhere; hence, the animal kingdom was composed of an unbroken series of animals. The most important system of classification evolved by this school is that of Oken. Corresponding with the invertebrates is Oken's intestinal-body, or touch-animals, as he called them (*Lehrbuch der Naturphilosophie*, Jena, 1810).

Grade I. INTESTINAL ANIMALS.
Cycle I. *Digestive Animals* (Radiata).
Class 1. Infusoria (Stomach Animals).
Class 2. Polypi (Intestine Animals).
Class 3. Acalephæ (Lacteal Animals).
Cycle II. *Circulative Animals* (Mollusks).
Class 4. Acephala (Biauriculate Animals).
Class 5. Gastropoda (Uniauriculate Animals).
Class 6. Cephalopoda (Bicardial Animals).
Cycle III. *Respirative Animals* (Articulata).
Class 7. Worms (Skin Animals).
Class 8. Crustacea (Branchial Animals).
Class 9. Insects (Tracheal Animals).

At the time that the School of Natural Philosophy was thriving, another school had arisen in Germany, which was rapidly accumulating a new set of facts. This was the School of Embryologists, which seems to have arisen under the influence of Döllinger and such men as Rathke, Van Beneden, Von Baer, Kölliker, and Vogt as disciples. Von Baer early got the idea that the ontogenetic development of animals is a recapitulation of their phylogenetic history; and, in conformity with his embryological investigations, he proposed the following classification of animals:

I. Peripheral Type (Radiata).
II. Massive Type (Mollusca).
III. Longitudinal Type (Articulata).
IV. Doubly Symmetrical Type (Vertebrata).

Thus, Von Baer, with his classification based on embryological principles, and Cuvier with his founded on comparative anatomy, arrived at very similar general conclusions; viz. that animals are built on four general plans, fall into four general types. In the end the system of Cuvier triumphed over that of the Natural Philosophers. The later advances in the classification of animals have been mainly made in filling gaps and correcting errors. The number of types has been increased. The Protozoa have become a distinct type, Cœlenterata and Echinodermata have been separated; likewise Arthropoda and Annelida, and the old group Mollusca has been broken up. The earlier classifications, founded mainly on external resemblances and grosser anatomical likenesses, were then greatly improved by the refinement of anatomical technique—by the use of the microscope, by the study of embryology, by the distinction between analogy and homology, by a knowledge of the fertility of animals in cross-breeding, and by the study of fossil-forms. With the discovery of so many intermediate forms we are coming back toward the views of the Natural Philosophers, who maintained that unity rules throughout the animal kingdom, as well as in all others; that intermediate forms connect the various types, and that there is no sharp line of demarcation to be drawn between the various groups of animals.

Two systems which have had great influence, especially in directing the study of the different invertebrates, were those of Louis Agassiz and Huxley. Agassiz retained the four types of Cuvier. Most of the Protozoa he considered to be algæ, and such forms as the Vorticella he thought would be found to be closely related to the Bryozoa. Following is an outline of Agassiz's arrangement, from his *Essay on Classification* (Boston, 1859):

I. *Radiata.*
(1) Polypi: Actinoids and Halcyonoids.
(2) Acalephæ: Hydroids, Discophoræ, and Ctenophoræ.
(3) Echinoderms: Crinoids, Asteroids, Echinoids, Holothurioids.
II. *Mollusca.*
(1) Acephala: Bryozoa, Brachiopods, Tunicata, Lamellibranchiata.
(2) Gastropoda: Pteropoda, Heteropoda, and Gastropoda.
(3) Cephalopoda: Tetrabranchiata and Dibranchiata.
III. *Articulata.*
(1) Worms: Trematodes, Nematodes, Annelids.
(2) Crustacea: Rotifera, Entomostraca, Tetradecapods, and Decapods.
(3) Insecta: Myriapods, Arachnids, and Insects proper.

Huxley arranges the invertebrates in nine sections, as follows:

Section I. Monera (Foraminifera: Heliozoa); Radiolaria, Protoplasta, Gregarinidæ, Catallacta, Infusoria (Opalinina, Ciliata, Flagellata, Tentaculifera).
Section II. Porifera, Hydrozoa, Coralligena (Ctenophora).
Section III. Turbellaria, Rotifera (Nematorhyncha), Trematoda, Cestoidea.
Section IV. Hirudinea, Oligochæta, Polychæta, Gephyrea.
Section V. Crustacea, Arachnida (Pycnogonida, Tardigrada, Pentastomida), Myriapoda, Insecta.
Section VI. Polyzoa, Brachiopoda, Lamellibranchiata, Odontophora.
Section VII. Echinodermata.
Section VIII. Tunicata.
Section IX. Groups of uncertain place: Peripatidea, Myzostomata, Enteropneusta, Chætognatha, Nematoidea, Physemaria, Acanthocephala, Dicyemida.

"Our knowledge," says Huxley, "of the anatomy, and especially of the development of the Invertebrata, is increasing with such prodigious rapidity, that the views of taxonomists in regard to the proper manner of expressing that knowledge by classification are undergoing, and, for some time to come, are likely to undergo, incessant modification. To the beginner, who is apt to make the mistake of looking upon classification as the foundation and essence of morphology, instead of what it really is, the superstructure and outcome thereof, this state of things is distressing. Every handbook presents him with a different system of classification; and he may, not unnaturally, despair of finding any stability in science, the most general results of which are capable of being stated in such different ways. If, however, the student will attend to the facts which constitute the subject-matter of classification, rather than to the modes of generalizing them which are expressed in taxonomic systems, he will find that, however apparently divergent these systems may be, they have a great deal in common."

It has seemed desirable to dwell somewhat on the history of the classification of the Invertebrata, because invertebrates have been the battling-ground, the bone of contention, with systematists since the time of Linnæus. The classification of vertebrates was early agreed upon; indeed, four of the six classes now accepted have come down to us from Aristotle's time.

Classification of Vertebrates. *Fishes.*—Ichthyology began as a science with Artedi (q.v.), who made a division into five classes, in a useful but very artificial manner. This continued substantially unchanged until the gigantic labors of Cuvier resulted in a revised classification, much nearer nature, recognizing clearly the distinction between the fishes with bony skeletons and those with cartilaginous skeletons. Agassiz followed with a classification based upon the forms of the scales, the most important feature of which was the recognition of the group Ganoidei. The next great generalization in this direction of systematic arrangement was that of J. Müller, who developed the distinctness of Amphioxus and the lampreys from other cartilaginous fishes, and so established the new groups Cyclostomi and Leptocardii; he also proposed the group Dipnoi for Lepidosiren. Huxley's studies and new material threw new light upon the subject, and aided Gunther to form a classification of fishes which, with one important exception, is still held by ichthyologists. For details, see Fish.

Amphibia.—The Amphibia were for a long time confused with the Reptilia. Thus Linnæus, 1767, who first used the term Amphibia as a group-name, included under it: (1) *Reptiles pedati*, including turtles (Testudo); Draco; Lacerta (including crocodiles, lizards, and newts); and Rana. (2) *Serpentes apodi*. (3) *Nantes pinnati*, including certain fishes. Brongniart, 1800, classifies reptiles as: Chelonia, Saurii, Ophidii, and Batrachii (the last including frogs, toads, and newts). Latreille, 1804; Duméril, 1806; and Oppel, 1811, while more sharply discerning the true subdivisions of amphibians, still retain them under the head of reptiles. First, De Blainville, writing in 1816, makes Reptilia and Amphibia coördinate, but subdivisions of the 'Amphibiens;' so likewise Stannius, as late as 1856. Latreille, 1821, however, proposes a classification which is essentially the same as that we now accept.

Reptiles.—Reptiles were put by Linnæus under the class Amphibia, and it was not until Brongniart separated them that herpetology began upon a philosophic basis. It was further advanced by Duméril (1807) and Oppel (1811), who placed Cæcilia with the amphibians. Cuvier and other writers did little to establish a rational system within this group; and even Duméril and Bibron, in their great *Erpétologie générale* (1834-54), cling to the idea that the batrachians are only separable as an order from reptiles. Although De Blainville, Leuckart, and others had advocated a much deeper separation, it was not until Huxley's investigations demonstrated the necessity of regarding the Amphibia and Reptilia as distinct classes that they were so set apart. See Reptile.

Huxley, in his *Anatomy of Vertebrated Animals* (1871), divided the Vertebrata into Ichthyopsida (fishes, leptocardians, marsipobranchs, and Amphibia), Sauropsida (birds and reptiles), and Mammalia.

Mammals and Birds.—Birds were too easily distinguished and too compact a class to have been much confounded with anything else, though mediæval writers often put bats, bees, etc., under the name. The history of their classification, therefore, falls within lines agreed upon from the first, and belongs to the article Bird. The same may be said of the class Mammalia, where the only confusion arose from the foolishness of a few mediæval authors, who classed bats among birds, and whales with fishes; the history of its classification will be found under Mammalia.

Outline of Modern Classification. The earlier writers always classified the animal kingdom in a linear series; usually beginning with mankind, and 'descending' to the creatures deemed most inferior. This was not with them, as it is with us, a mere matter of convenience in making a list of the groups, but expressed their belief in the doctrine, unchallenged from antiquity to the time of Lamarck and Cuvier, that there existed what they called a *scala naturæ*. They meant by that their belief that all animals could be arranged in an ascending scale of organization—the infusorians being succeeded by polyps, these by radiated forms, these by worms, and so on to fishes, reptiles, birds, and mammals. The orders within each class, the genera within each family, conformed to the same scale of increasing complexity; so that a linear classification, from the lower invertebrates to the highest vertebrates, was the expression of their belief in an even progress of structure. Cuvier broke into this by his arrangement of the animal kingdom, into four groups, unrelated to each other—Radiata, Articulata, Mollusca, and Vertebrata—to be classified in parallel columns, if at all; and this, again, has been superseded by the conception of a form of classification which simulates a branching tree, and tries to express a true genetic arrangement (see Phylogeny), the first attempt at which was made by Lamarck. It is, however, impracticable in the present work to attempt such an expression of the classification of animals, except for restricted groups; and, in general, the linear arrangement must be used, bearing in mind that it is a convenient, not a scientific, expression.

The classification outlined below, and followed throughout this Encyclopædia, is that made by Profs. T. Jeffrey Parker and William A. Haswell (*Text-Book of Zoölogy*, London and New York, 1897). It is the most complete formulation of scientific conclusions, has an almost world-wide acceptance, and is generally accessible to students and readers. These considerations outweigh, for the purposes of a popular encyclopædia, any objections likely to be urged against these authorities by specialists. The advantage of taking and keeping a uniform standard of classification and nomenclature throughout a work of this kind is too evident to require argument; and should there be good reason to differ from it, here and there, these exceptions and divergences may easily be treated as they arise. In paleontology this scheme is supplemented by the substantially identical classification of Zittel-Eastman (Karl A. Von Zittel, *Grundzüge der Paläontologie*, Munich, 1895; translated and modified by C. R. Eastman, as *Text-Book of Paleontology*, New York and London, 1900).

It is needful here only to sketch the arrangement of the larger groups, leaving the treatment of orders, families, and lesser divisions to be given in the descriptive articles under the titles of groups, as Birds, Fish, Protozoa, etc.

CLASSIFICATION OF ANIMALS.

List of Phyla, Classes, and Subclasses.

Subdivision Protozoa
(Unicellular Animals).

Phylum I. Protozoa (Protozoans). Animals composed of a single cell; or, if of several cells, these are of one kind.

Class 1. Rhizopoda. Protozoa with retractile pseudopodia (Amœba, etc.)

Class 2. Mycetozoa. Terrestrial protozoa, plasmodial, and forming large and complex cysts (Slimes).

Class 3. Mastigophora. Protozoa without cilia, but with one or more flagella.

Class 4. Sporozoa. Protozoa, without appendages; internal parasites.

Class 5. Infusoria. Protozoa with cilia, or sucking tentacles.

Subdivision Metazoa
(Multicellular Animals).

Phylum II. Porifera (Sponges). Fixed aquatic Metazoa, whose body-wall is perforated by incurrent pores.

Class Porifera. Equivalent to the Phylum.

Subclass 1. *Calcarea.* Sponges with skeleton of calcareous spicules.

Subclass 2. *Non-Calcarea.* Skeleton, when present, composed of siliceous spicules or of spongin fibres.

Phylum III. Cœlenterata (Polyps, etc.). Animals of radial structure, whose digestive cavity is lined by the body-wall, and which have nettling organs.

Class 1. Hydrozoa. Cœlenterates, whose body is composed of more than two rays, and contains a single cavity (Hydroids, Siphonophores, etc.).

Class 2. Scyphozoa. Cœlenterates with many radii, and with radial partitions in the cavity of the body (Jellyfishes).

Class 3. Actinozoa. Attached individuals or colonies.

Subclass 1. *Zoantharia.* Tentacles numerous, and usually in multiples of five (Sea-Anemones, Madrepores, and Corals).

Subclass 2. *Alcyonaria.* Tentacles, eight only (Red Corals, Sea-Fans, etc.).

Class 4. Ctenophora. Cœlenterates with only two radii, and rows of cilia-plates.

Phylum IV. Platyhelminthes (Flatworms). Bilaterally symmetrical, soft-bodied animals, without true segmentation of the body; flattened in a dorso-ventral direction, and having the body-cavity filled with a loose meshwork of cells.

Class 1. Turbellaria. Free-living flatworms, whose body is covered by cilia; alimentary tract with only one opening to the exterior (Planarians).

Class 2. Trematoda. Parasitic, unsegmented, without cilia in the adult, and with a well-developed digestive apparatus (Flukes).

Class 3. Cestoda. Elongated, usually unsegmented hermaphrodite endoparasites, without mouth or alimentary canal (Tapeworms, etc.).

Class 4. Nemertinea. Body more or less flattened; food-canal with mouth and arms; aquatic, carnivorous.

Subclass 1. *Palæonemertinea.*

Subclass 2. *Schizonemertea.*

Subclass 3. *Hoplonemertea.*

Phylum V. Nemathelminthes (Roundworms). Bilateral, unsegmented, round-bodied; usually with alimentary tract, mouth, and arms.

Class 1. Nematoda. With intestinal canal; without proboscis; free-living in fresh or salt water, or parasitic (Threadworms).

Class 2. Acanthocephala. Mouth and intestines wanting; parasitic.

Class 3. Chætognatha. Pelagic 'arrow-worms;' spiny, and with a well-developed nervous system.

Phylum VI. Trochelminthes (Wheel-Animalcules.) Characterized by having the larva in the form of a trochosphere.

Class 1. Rotifera. Microscopic wheel-animalcules, with a ciliated band around the mouth, and a special organ for attachment.

Class 2. Dinophilea. Minute, worm-like, having five to eight segments, usually ciliated; and nephridia in pairs: marine.

Class 3. Gastrotricha. Minute, spindle-shaped, flattened and ciliated on the ventral surface; fresh waters.

Phylum VII. Molluscoida (Sea-Mats and Brachiopods). Small aquatic animals, having a true body-cavity (except in Endoprocta) and suspended alimentary canal; dorsal region abbreviated and surmounted by lophophore.

Class 1. Polyzoa. Molluscoida that form colonies connected by one organic substance; the ciliated band of the lophophore is drawn out into tentacles (Bryozoans).

Subclass 1. *Ectoprocta.* Anus outside tentacular corona.

Subclass 2. *Endoprocta.* Anus internal; form colonies by budding.

Class 2. Phoronida. Worm-like polyzoans, living in associations of individuals born from ova, not by buds.

Class 3. Brachiopoda. Polyzoa with the body inclosed in a shell of two valves; body usually attached by a stalk (Lamp-Shells).

Phylum VIII. Echinodermata (Echinoderms). Animals of prevailingly radical structure, with intestinal wall distinct from body-wall, and with calcareous plates in the skin.

Class 1. Asteroidea. Star-shaped echinoderms, with a furrow (ambulacrum) along the under side of the arms (Starfish).

Class 2. Ophiuroidea. Star-shaped echinoderms, with the arms sharply marked off from the body, and not grooved (Brittle Stars).

Class 3. Echinoidea. Echinoderms with the body globular or disk-shaped, and armless (Sea-Urchins).

Class 4. Holothuroidea. Echinoderms elongated, worm-like, usually soft, and with tentacles about the mouth (Trepangs).

Class 5. CRINOIDEA. Sessile, and having a cup-shaped body (Crinoids).

Class 6. CYSTOIDEA. Globular, sessile, or stalked (Fossil).

Class 7. BLASTOIDEA. Ovate, stalked (Fossil).

Phylum IX. ANNULATA (Worms). Bilateral segmented worms without jointed legs.

Class 1. CHÆTOPODA. Worms made up of a series of metameres, each bearing parapodia and cirri (Annelids).

Subclass 1. *Polychæta.* Sexes distinct; ovaries and testes simple and metamerically repeated (Marine Annelids).

Subclass 2. *Oligochæta.* Sexes united; ovaries and testes few and compact (Terrestrial and freshwater).

Class 2. MYZOSTOMIDA. Disk-shaped, unsegmented (Parasites of Crinoids).

Class 3. GEPHYREA. Sessile annelids, without external segmentation in the adult (Marine).

Class 4. ARCHI-ANNELIDA. Minute marine annelids, faintly segmented, often parasitic.

Class 5. HIRUDINEA. Annelids with short rings or none at all, and with ventral suckers (Leeches).

Phylum X. ARTHROPODA (Insects, Crustaceans, etc). Symmetrical segmented animals, with jointed appendages.

Class 1. CRUSTACEA. Typically aquatic and gill-bearing; usually two pairs of antennæ (Crustaceans).

Subclass 1. *Entomostraca.* Usually small, and with a varied number of appendages (Water-Fleas, etc.).

Subclass 2. *Malacostraca.* Crustacea with nineteen pairs of appendages (Crabs, Crayfish, etc.).

Class 2. TRILOBITA. Body depressed, oval, and divided into head, thorax, and abdomen (Extinct Trilobites).

Class 3. ONYCHOPHORA. Cylindrical, unsegmented, papillose, and with a series of short walking appendages (Peripatus).

Class 4. MYRIAPODA. Tracheate arthropods, consisting of several segments, each bearing one or two pairs of legs (Centipedes and Millipedes).

Class 5. INSECTA. Arthropods with the body in three divisions—head, thorax, and abdomen—with six thoracic legs, and usually with wings (Insects).

Class 6. ARACHNIDA. Air-breathing arthropods, without antennæ (Spiders, Scorpions, etc.).

Phylum XI. MOLLUSCA (Mollusks). Animals with unsegmented body, and without jointed appendages; usually with a shell, and with a muscular organ of locomotion (the foot).

Class 1. PELECYPODA. Mollusks with a nearly symmetrical body, leaf-like gills, and a two-valved shell (Bivalves).

Class 2. AMPHINEURA. Bilaterally symmetrical; anus at end of body (Chitons).

Class 3. GASTROPODA. Body unsymmetrical, with head, feelers, eyes, and unpaired foot; shell (when present) univalve (Gastropods).

Subclass 1. *Streptoneura.* Visceral commissures twisted into a figure-of-8; sexes distinct (Limpets, Whelks, etc.).

Subclass 2. *Euthyneura.* Visceral commissures not twisted into a figure-of-8; sexes united (Pulmonates, Nudibranchs, etc.).

Class 4. SCAPHOPODA. Head rudimentary; mouth-lobes formed into a tube, inclosing the delicate shell (Marine).

Subclass 1. *Scaphopoda.* As above (Tusk-Shells).

Subclass 2. *Rhodope.* Minute, ciliated; no shell.

Class 5. CEPHALOPODA. Head large; mouth surrounded by arms; foot funnel-shaped (Cuttlefish).

Subclass 1. *Dibranchiata.* Two symmetrical branchiæ; funnel tubular (Squids and Octopods).

Subclass 2. *Tetrabranchiata.* Four branchiæ; shell multilocular (Nautilus and Ammonites).

Phylum XII. CHORDATA (Chordates). Animals having a notochord, which may (Subphylum C) persist from birth, and become "in the adult replaced more or less completely by a segmented bony or cartilaginous axis—the spinal or vertebral column."

Subphylum and Class A. ADELOCHORDA. Marine worm-like animals, having a notochord as larvæ (Balanoglossus, etc.).

Subphylum and Class B. UROCHORDA. Animals, simple or compound, marine, inclosed in a coriaceous test, composed largely of cellulose, and having a notochord when larvæ (Ascidians).

Subphylum C. VERTEBRATA. Animals bilaterally symmetrical, and having a backbone (Vertebrates).

SEC. I. ACRANIA. *Without a head* (includes only the family Branchiostomidæ, Amphioxus, etc.).

SEC. II. CRANIATA. *With a head* (Fishes, Reptiles, Birds, Mammals).

Class 1. CYCLOSTOMATA. Eel-like vertebrates, without a lower jaw; mouth suctorial, and armed with horny teeth (Lampreys).

Class 2. PISCES. Aquatic vertebrates, with persistent gills and paired fins (Fishes).

Subclass 1. *Elasmobranchii.* Fishes with a cartilaginous skeleton, in which the cranium is never ossified, nor contains membrane-bones; gill-openings usually in five pairs (Sharks and Rays).

NOTE. The *Pycnogonida, Linguatulida,* and *Tardigrada,* "though not in any way related to one another, and of doubtful relationships to the Arachnida, are, as a matter of convenience, mentioned together here."—*Parker and Haswell.*

Subclass 2. *Holocephali.* Cartilaginous fishes with four pairs of gill-slits, nearly concealed by a fold of skin (Chimæras).

Subclass 3. *Teleostomi.* Fishes with the skeleton complicated by membrane-bones and ossifications, or completely bony (Sturgeons and ordinary Fish).

Subclass 4. *Dipnoi.* Fish-like animals, having an apparatus for breathing atmospheric air (Lungfishes).

Subclass 5. *Ostracodermi.* Paleozoic fishes, with an exoskeleton extraordinarily developed about the head, and apparently with no endoskeleton (Cephalaspis, etc.).

Class 3. Amphibia. Amphibious vertebrates, breathing by gills in the larval condition, and (usually) by lungs when adult, and having legs and five-toed feet (Amphibians).

Class 4. Reptilia. Elongated, air-breathing vertebrates, with a horny epidermal skeleton of scales and one occipital condyle (Reptiles).

Class 5. Aves. Vertebrates clothed with feathers (Birds).

Subclass 1. *Archæornithes.* Birds having a prolonged tail of many vertebræ (Archæopteryx).

Subclass 2. *Neornithes.* Birds having the tail-vertebræ compacted into a pygostyle (Modern Birds).

Class 6. Mammalia. Vertebrates which suckle their young, and are more or less clothed with hair (Mammals).

Subclass 1. *Prototheria.* Mammals with oviducts separated (Didelphia).

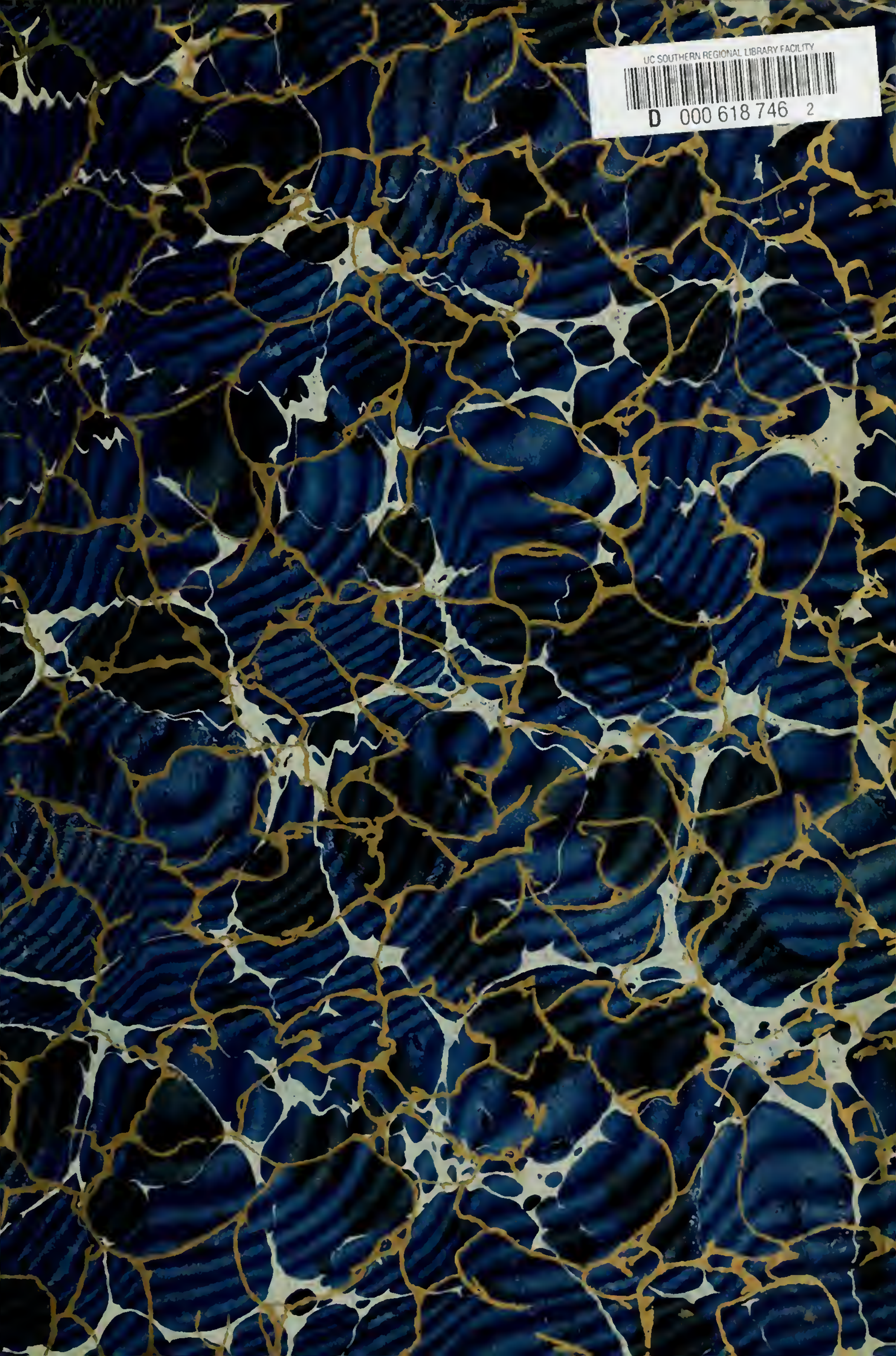
Subclass 2. *Theria.* Mammals with oviducts united for a longer or shorter part of their length (Monodelphia).

A. *Metatheria.* Young born in rudimentary condition, and sheltered in a pouch (Marsupials).

B. *Eutheria.* Young born in a uterus; no pouch present (higher Mammals).

Bibliography. In addition to works mentioned above, consult: Bronn (editor), *Klassen und Ordnungen des Thierreichs* (Leipzig and Heidelberg, 1859, et seq.); Haeckel, *Natürliche Schöpfungsgeschichte* (Jena, 1868); Lankester, *Notes on Embryology and Classification* (London, 1877), and article "Zoölogy" in 9th ed. *Encyclopædia Britannica;* Leunis, *Synopsis der Thierkunde* (Hanover, 1883-86); Huxley, *Anatomy of Vertebrates* (New York, 1878), and *Anatomy of Invertebrated Animals* (New York, 1888); *Standard Natural History* (Boston, 1885); Lang, *Text-book of Comparative Anatomy* (London, 1891-96); Newton, *Dictionary of Birds* (London and New York, 1893-96); *Royal Natural History* (London, 1895); *Cambridge Natural History* (Cambridge, Eng., 1895, et seq.); Parker and Haswell, *Text-book of Zoölogy* (London and New York, 1897); Davenport, *Introduction to Zoölogy* (New York, 1900). See, also, books mentioned under Evolution; Embryology; and such titles as Bird, Fish, Insect, etc., and under biographies of the naturalists above mentioned.

CLASSIFICATION OF SHIPS. See A1; and Lloyds.



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